

## Section 150 (k) Residential Lighting

### (k) Residential Lighting.

#### 1. ~~High Efficacy~~ Luminaire Requirements

A. Luminaire Efficacy: Installed luminaires shall be classified as high-efficacy or low-efficacy for compliance with Section 150(k) ~~according in accordance with to~~ Tables 150-C and 150-D, as applicable

B. Hybrid Luminaires: When a high efficacy and low efficacy lighting system are combined together in a single luminaire, the high efficacy and low efficacy lighting systems shall separately comply with the applicable provisions of Section 150(k)

C. Recessed Downlights: Recessed downlights shall not contain medium screw-base sockets ~~A high efficacy luminaire or LED Light Engine with Integral Heat Sink has an efficacy that is no lower than the efficacies contained in TABLE 150-C and is not a low efficacy luminaire as specified by Section 150(k)2.~~

~~**EXCEPTION 1 to Section 150(k)1:** To qualify as high efficacy, a luminaire rated only for use with a high intensity discharge reflector lamp shall have a minimum lamp efficacy within 2 lumens per watt of the minimum lamp efficacies in TABLE 150-C.~~

~~**EXCEPTION 2 to Section 150(k)1:** When a high efficacy LED Light Engine with Integral Heat Sink is combined with a low efficacy lighting system in a Hybrid LED Luminaire as defined in Section 101, the high efficacy and low efficacy lighting systems shall separately comply with the applicable provisions of Section 150(k).~~

2. ~~Low Efficacy Luminaires.~~ A low efficacy luminaire is any luminaire that does not qualify as high efficacy as specified by Section 150(k)1, or any of the following regardless of the efficacy:

~~A. Contains a medium screw base socket (E24/E26) or other line voltage socket or a line voltage lamp holder; or~~

~~**EXCEPTION 1 to Section 150(k)2A:** High intensity discharge (HID) luminaires containing factory installed ballasts and HID rated medium screw base sockets shall be considered high efficacy luminaires provided they meet the efficacies contained in TABLE 150-C.~~

~~**EXCEPTION 2 to Section 150(k)2A:** A Luminaire with a factory installed GU-24 lamp holder may be classified as high efficacy provided that it meets all of the following requirements:~~

~~i. Is not a recessed downlight that is rated to be used with compact fluorescent lamps; and~~

~~ii. Does not contain any other type of line voltage socket or lamp holder; and~~

~~iii. The manufacturer does not make available adaptors or modular components for the luminaire which convert the GU-24 lamp holder to any other type of socket or lamp holder; and~~

~~iv. Is rated, as specified by UL 1598, for use only with high efficacy lamps or high efficacy LED Light Engine with Integral Heat Sink meeting the requirements contained in TABLE 150-C, as listed on a permanent, pre-printed, factory installed label on the luminaire housing.~~

~~B. Low voltage incandescent lighting; or~~

~~C. Track lighting or other lighting systems which allow the addition or relocation of luminaires without altering the wiring of the system; or~~

- ~~D. Lighting systems which have modular components that allow conversion between screw-based and pin-based sockets without changing the luminaires' housing or wiring; or~~
- ~~E. Electrical boxes finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan.~~
- 32. Luminaire Wattage.** The wattage of permanently installed luminaires in residential kitchens shall be determined ~~as specified by~~ in accordance with Section 130(d). In residential kitchens the wattage of electrical boxes finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan, shall be calculated as 180 watts of low efficacy lighting per electrical box.
- 43. Electronic Ballasts.** Ballasts for fluorescent lamps rated 13 watts or greater shall be electronic and shall have an output frequency no less than 20 kHz.
- 54. Night Lights.** Permanently installed night lights and night lights integral to a permanently installed luminaire or exhaust fan shall ~~meet one of the following conditions:~~
- ~~A. Shall contain only high efficacy lamps meeting the minimum efficacies contained in TABLE 150-C and shall not contain a line voltage socket or line voltage lamp holder; or~~
- ~~B. Shall be rated to consume no more than 5 watts of power as determined by~~ in accordance with Section 130(d), and shall not contain a medium screw-base socket.
- ~~**NOTE:** Indicator lights that are integral to lighting controls shall comply with Section 119(b).~~
- 65. Lighting Integral to Exhaust Fans.** Lighting integral to exhaust fans, ~~in rooms other than kitchens,~~ shall meet the applicable requirements of Section 150(k).
- 76. Switching Devices and Controls.**
- A. ~~All permanently installed h~~High efficacy luminaires shall be switched separately from low efficacy luminaires.
- B. ~~All e~~Exhaust fans shall be switched separately from lighting system(s); ~~or, -~~
- ~~EXCEPTION to Section 150(k)7B: An for an exhaust fan with an integral lighting system, where the lighting system can shall be manually turned on and off separately switched in accordance with the applicable provision of Section 150(k) while allowing the fan to continue to operate for an extended period of time.~~
- C. ~~All permanently installed l~~Luminaires shall be switched with readily accessible controls that permit the luminaires to be manually switched ~~on~~ON and ~~off~~OFF.
- D. ~~All l~~Lighting controls and equipment shall be installed in accordance with the manufacturer's instructions.
- E. ~~No controls shall bypass a dimmer or vacancy sensor function A lighting circuit controlled by more than one switch~~ where a dimmer or ~~manual on-occupant~~vacancy sensor has been installed to comply with Section 150(k) ~~shall meet the following conditions:~~
- ~~i. No controls shall bypass the dimmer or manual on-occupant sensor function.~~
- ~~ii. The dimmer or manual on-occupant sensor shall comply with the applicable requirements of Section 119.~~
- F. ~~Manual on-occupant sensors, motion sensors, and dimmers~~Lighting controls installed to ~~comply with Section 150(k)~~ shall comply with the applicable requirements of Section 119.
- 87. Lighting in Kitchens.** A minimum of 50 percent of the total rated wattage of permanently installed lighting in kitchens shall be high efficacy.

EXCEPTION to Section 150(k)~~8~~<sup>7</sup>A: Up to 50 watts for dwelling units less than or equal to 2,500 ft<sup>2</sup> or 100 watts for dwelling units larger than 2,500 ft<sup>2</sup> may be exempt from the 50 percent high efficacy requirement when ~~the following conditions are met:~~

A. ~~All low efficacy luminaires in the kitchen are controlled by a manual-on occupant/vacancy sensors, dimmers, energy management control system (EMCS), or a multi-scene programmable control system having dimming functionality; and are switched in accordance with the applicable provisions in Section 150(k)6.~~

B. ~~All permanently installed luminaires in garages, laundry rooms, closets greater than 70 square feet, and utility rooms are high efficacy and are controlled by a manual-on occupant sensor.~~

NOTE: For the purpose ~~of this requirement~~ compliance with Section 150(k)7, kitchen lighting includes all permanently installed lighting in the kitchen except for lighting that is internal to cabinets for the purpose of illuminating only the inside of the cabinets. Lighting in areas adjacent to the kitchen, including but not limited to dining and nook areas, are considered kitchen lighting if they are not separately switched from kitchen lighting.

98. **Lighting i**~~n~~<sup>Internal to e</sup>**Cabinets.** Permanently installed lighting that is internal to cabinets shall use no more than 20 watts of power per linear foot of illuminated cabinet. The length of an illuminated cabinet shall be determined using one of the following measurements, regardless of the number of shelves or the number of doors per cabinet section:

A. One horizontal length of illuminated cabinet, or

B. One vertical length, per illuminated cabinet section, or

C. No more than one vertical length per every 40 horizontal inches of illuminated cabinet.

9. **Lighting in Bathrooms.** Lighting installed in bathrooms shall meet the following requirements:

A. A minimum of one high efficacy luminaire shall be installed in each bathroom; and

B. All other lighting installed in each bathroom shall be high efficacy or controlled by a vacancy sensor.

10. **Lighting in**~~Bathrooms, Garages, Laundry Rooms, Closets, and Utility Rooms.~~ **Permanently** Lighting installed ~~luminaires in bathrooms,~~ attached and detached garages, laundry rooms, ~~closets~~ and utility rooms shall be high efficacy luminaires and shall be controlled by a vacancy sensor. Vacancy sensors in garages shall use ultrasonic, dual technology, or other methods for occupant detection which do not rely solely on line of sight.

**EXCEPTION 1 to Section 150(k)10:** Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by a manual-on occupant sensor certified to comply with the applicable requirements of Section 119.

**EXCEPTION 2 to Section 150(k)10:** Permanently installed low efficacy luminaires in closets less than 70 square feet are not required to be controlled by a manual-on occupant sensor.

11. **Lighting in Hallways.** Lighting installed in hallways shall meet the following requirements:

A. Be high efficacy or controlled by a vacancy sensor or dimmer; and

B. Chandeliers, pendants, and sconces installed in hallways shall not contain medium screw-base sockets.

12. **Lighting other than in Kitchens, Bathrooms, Garages, Laundry Rooms, Closets, and Utility Rooms, and Hallways.** Permanently Lighting installed ~~luminaires located~~ in rooms or areas other than in kitchens, bathrooms, garages, laundry rooms, ~~closets, and~~ utility rooms, and hallways shall be high efficacy luminaires, or shall be controlled by vacancy sensors, dimmers, an energy management control system (EMCS), or a multi-scene programmable control system having dimming functionality, or shall be controlled by either a dimmer switch or by a vacancy sensor.

**EXCEPTION 1 to Section 150(k)12:** Luminaires in closets less than 70 square feet.

~~EXCEPTION 1 to Section 150(k)11: Permanently installed low efficacy luminaires shall be allowed provided they are controlled by either a dimmer switch that complies with the applicable requirements of Section 119, or by a manual on-occupant vacancy sensor that complies with the applicable requirements of Section 119.~~

**EXCEPTION 2 to Section 150(k)12:** Lighting in detached storage buildings less than 1000 square feet located on a residential site is not required to comply with Section 150(k)11.

**132. Recessed Luminaires in Insulated Ceilings.** Luminaires recessed into insulated ceilings shall meet all of the following conditions:

- A. Be listed, as defined in Section 101, for zero clearance insulation contact (IC) by Underwriters Laboratories or other nationally recognized testing/rating laboratories; and
- B. Have a label that certifies that the luminaire is airtight with air leakage less than 2.0 CFM at 75 Pascals when tested in accordance with ASTM E283; and

~~EXCEPTION to Section 150(k)12B~~**Note:** An exhaust fan housing shall not be required to be certified airtight.

- C. Be sealed with a gasket or caulk between the luminaire housing and ceiling, and shall have all air leak paths between conditioned and unconditioned spaces sealed with a gasket or caulk; and

~~Note: An exhaust fan shall be sealed with a gasket or caulk between the exhaust fan housing and ceiling.~~

- D. For recessed compact fluorescent luminaires with ballasts to qualify as high efficacy for compliance with Section 150(k), the ballasts shall be certified to the Commission to comply with Section 119(n); and
- E. Allow ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling.

**134. Residential Outdoor Lighting.** Luminaires providing residential outdoor lighting shall meet the following requirements, as applicable: ~~including outdoor lighting for private patios on low-rise residential buildings with four or more dwelling units, entrances, balconies, and porches, and which are permanently mounted to a residential building or to other buildings on the same lot shall be high efficacy luminaires.~~

A. For single-family residential buildings, outdoor lighting permanently mounted to a residential building or other buildings on the same lot shall be high efficacy.

**EXCEPTION 1 to Section 150(k)13(A):** Permanently installed outdoor low efficacy luminaires shall be allowed provided that they are controlled by a manual on/off ON and OFF switch, a motion sensor not having an override or bypass switch that disables the motion sensor, and one of the following methods:

A.i. Photocontrol not having an override or bypass switch that disables the photocontrol; or

B.ii. Astronomical time clock not having an override or bypass switch that disables the astronomical time clock; or

C.iii. Energy management control system (EMCS) not having an override or bypass switch that allows the luminaire to be always on ON.

**Note: EXCEPTION 2 to Section 150(k)13:** Outdoor low efficacy luminaires used to comply with the Exception 1 to Section 150(k)13(A) may be controlled by a temporary override switch which bypasses the motion sensing function provided that the motion sensor is automatically reactivated within 6 hours.

B. For low-rise multi-family residential buildings, outdoor lighting for private patios, entrances, balconies, and porches, shall be high efficacy.

**EXCEPTION to Section 150(k)14(B):** Outdoor lighting for low-rise multi-family residential private patios, entrances, balconies, and porches, shall comply with the applicable requirements in Sections 119, 130, 132, 134, 147, and 149

C. For low-rise residential buildings with four or more dwelling units, outdoor lighting installed for use other than private patios, entrances, balconies, and porches, shall comply with the applicable requirements in Sections 119, 130, 132, 134, 147, and 149

~~**EXCEPTION 3 to Section 150(k)13:** Permanently installed luminaires in or around swimming pools, water features, or other locations subject to Article 680 of the California Electric Code need not be high efficacy luminaires.~~

~~. Outdoor lighting for residential parking lots and residential carports with a total of eight or more vehicles per site shall comply with the applicable requirements in Sections 119, 130, 132, 147, and 149~~

**4145.** **Internally illuminated address signs.** Internally illuminated address signs shall:

- A. Comply with Section 148; or
- B. Not contain a screw-base socket, and consume no more than 5 watts of power as determined according to Section 130(d).

**156. Parking Lots and Residential Garages for Eight or More Vehicles.** ~~Lighting for parking lots and carports with a total of eight or more vehicles per site shall comply with the applicable requirements in Sections 130, 132, 134, and 147. Lighting for residential parking garages for eight or more vehicles shall comply with the applicable requirements in Sections 119, 130, 131, 134, and 146, and 149.~~

**167. Interior Common Areas of Low-rise Multi-Family Residential Buildings.** ~~Permanently installed lighting in the enclosed, non-dwelling spaces of low-rise residential buildings with four or more dwelling units shall be high efficacy luminaires.~~

A. In a low-rise multi-family residential building where the total interior common area equals 20 percent or less of the floor area, permanently installed lighting for the interior common areas in that building shall be high efficacy luminaires, or

~~**EXCEPTION to Section 150(k)167:** Permanently installed low efficacy luminaires shall be allowed provided that they are controlled by an occupant sensor(s) certified to comply with the applicable requirements of Section 119.~~

B. In a low-rise multi-family residential building where the total interior common area equals more than 20 percent of the floor area of that building, permanently installed lighting shall:

- i. Shall comply with the applicable requirements in Sections 119, 130, 131, 146, and 149; and
- ii. Lighting installed in corridors and stairwells shall be controlled by occupant sensors that reduce the lighting power in each space by at least 50 percent. Each luminaire must be controlled by no more than two occupant sensors.

***TABLE 150-C HIGH EFFICACY LUMINAIRE REQUIREMENTS***

<b>Lamp Power Rating for Non-LED Lighting (see Note 1), or System Power Rating for LED Lighting (see Notes 2, 3, and 4)</b>	<b>Minimum Lamp Efficacy for Non-LED Lighting, or Minimum System Efficacy for LED Lighting</b>
5 watts or less	30 lumens per watt
over 5 watts to 15 watts	40 lumens per watt
over 15 watts to 40 watts	50 lumens per watt
over 40 watts	60 lumens per watt
<b>Notes:</b>  1. <del>Determine minimum lamp efficacy category for lighting systems which are not LED using the initial rated lumens divided by the rated watts of the lamp (not including the ballast).</del>  2. <del>To qualify as high efficacy, an LED luminaire shall meet the minimum system efficacy requirements in Table 150-C when determined according to Reference Joint Appendix JA8, and be certified to comply with Section 119(m), and input power shall be determined according to Section 130(d)5.</del>  3. <del>For a Hybrid LED Luminaire to qualify as a high efficacy luminaire, all lighting systems in the luminaire shall qualify as high efficacy according to Section 150(k)1, and the LED Light Engine with Integral Heat Sink shall comply with Note 4, below.</del>  4. <del>To qualify as high efficacy, an LED Light Engine with Integral Heat Sink shall meet the minimum system efficacy requirements in Table 150-C when determined according to Reference Joint Appendix JA8, shall be certified to comply with Section 119(m), and input power shall be determined according to Section 130(d)5.</del>	

**TABLE 150-C CLASSIFICATION OF HIGH EFFICACY AND LOW EFFICACY LIGHT SOURCES**

<u>High Efficacy Light Sources</u>	<u>Low Efficacy Light Sources</u>
<u>Luminaires manufactured, designed and rated for use with only lighting technologies in this column shall be classified as high efficacy:</u>	<u>Luminaires manufactured, designed or rated for use with any of the lighting technologies in this column shall be classified as low efficacy.</u>
<u>1. Pin-based fluorescent lamps.</u> <u>2. Pulse-start metal halide lamps.</u> <u>3. High pressure sodium lamps.</u> <u>4. GU-24 sockets rated for LED lamps.</u> <u>5. GU-24 sockets rated for compact fluorescent lamps, and which are not recessed luminaires.</u> <u>6. Luminaires using LED light sources which have been certified to the Energy Commission as high efficacy in accordance with Joint Appendix JA-8.</u> <u>7. Luminaire housings rated by the manufacturer for use with only LED light engines.</u> <u>8. Induction lamps.</u> <u>Note: Adaptors which convert an incandescent lamp holder to a high-efficacy luminaire shall not be used to classify a luminaire as high efficacy.</u>	<u>1. Line-voltage lamp holders (sockets) capable of operating incandescent lamps of any type.</u> <u>2. Low-voltage lamp holders capable of operating incandescent lamps of any type.</u> <u>3. High efficacy lamps installed in low-efficacy luminaires, including screw base compact fluorescent and screw base LED lamps.</u> <u>3. Mercury vapor lamps.</u> <u>4. Track lighting or other flexible lighting system which allows the addition or relocation of luminaires without altering the wiring of the system.</u> <u>6. Luminaires using LED light sources which have not been certified to the Energy Commission as high efficacy.</u> <u>7. Lighting systems which have modular components that allow conversion between high-efficacy and low-efficacy lighting without changing the luminaires' housing or wiring.</u> <u>8. Electrical boxes finished with a blank cover or where no electrical equipment has been installed, and where the electrical box can be used for a luminaire or a surface mounted ceiling fan.</u>

**TABLE 150-D MINIMUM REQUIREMENTS FOR OTHER LIGHT SOURCES TO QUALIFY AS HIGH EFFICACY**

<u>Use this table to determine luminaire efficacy only for lighting systems not listed in Table 150-C</u>	
<u>Luminaire Power Rating</u>	<u>Minimum Luminaire Efficacy to Qualify as High Efficacy</u>
<u>5 watts or less</u>	<u>30 lumens per watt</u>
<u>over 5 watts to 15 watts</u>	<u>45 lumens per watt</u>
<u>over 15 watts to 40 watts</u>	<u>60 lumens per watt</u>
<u>over 40 watts</u>	<u>90 lumens per watt</u>
<u>Note: Determine minimum luminaire efficacy using the system initial rated lumens divided by the luminaire total rated system input power.</u>	

## Joint Appendix JA8

### JA-8 Residential High Efficacy LED Luminaires

#### Appendix JA8 – Minimum Requirements for Residential LED Source Systems to Qualify as High Efficacy

To qualify as a residential high efficacy luminaire using Light Emitting Diode (LED) as light source, the LED light engine (defined as in ANSI/IESNA RP-16-10) used in the luminaire shall be certified to the Energy Commission according to all of the following requirements. If the LED light engine is inseparable from the luminaire (integral LED luminaire) then the entire luminaire shall meet the same requirements.

- a. The integral LED luminaire or LED light engine shall be manufactured for use in residential applications
- b. The efficacy of the device under test when tested per IESNA LM-79-08 shall be equal to or greater than the efficacies contained in Table JA-8.
- c. The LED source system shall have a minimum Color Rendering Index of 90
- d. The LED source system shall have a Correlated Color Temperature within the range of 2700 to 3000
- e. The LED light engine shall be capable of being installed in a luminaire housing without using any type of base or socket used for incandescent lamps, it may include a GU-24 or modular quick connect, but shall not include screw base sockets or adaptors of type and size E12 through E39.
- f. An LED lamp, integrated or non-integrated type per definition in ANSI/IESNA RP-16-10, shall not be certified to the Energy Commission as a high efficacy luminaire, and shall not be classified as a high efficacy luminaire for compliance with Title 24, Part 6 of the CCR.
- g. The device under test shall be tested in a Underwriters Laboratory (UL) 1598 testing apparatus in a testing laboratory participating in the ISO/IEC 17025, by the National Voluntary Laboratory Accreditation Program (NVLAP) or other laboratory accreditation body operating in accordance with ISO/IEC 17011 and produced under an ongoing inspection program carried out by a Type A inspection body in accordance with ISO/IEC 17020, accredited to ISO/IEC 17020 by an accreditation body operating in accordance with ISO/IEC 17011.
- h. Each device tested shall produce the same quantity and quality of light. The device under test producing different Correlated Color Temperature (CCT), Color Rendering Index (CRI), total flux (per linear foot for linear systems) or other quantitative and qualitative differences in light shall be separately tested.
- i. The input wattage of the device under test shall be the maximum rated input wattage of the system. The maximum rated input wattage shall be listed on a permanent, pre-printed, factory-installed label as specified by UL.
- j. When multiple luminaire components are connected to a single power supply or driver, the label used to determine the maximum wattage of the entire LED luminaire system shall be located on the power supply or driver. The wattage of the luminaire system shall be either the connected load of the power supply or driver as determined by the manufacturer of the luminaire components, or the rating of the power supply or driver as determined by the manufacturer of the power supply or driver. The efficacy requirement is for the entire luminaire system.
- k. The performance characteristics including but not limited to 1) total luminous flux, 2) CCT, 3) CRI, and 4) efficacy of the device under test shall be permanently pre-printed on the LED circuit board, on a permanent pre-printed factory installed label on an integral LED trim or luminaire housing, or published in manufacturer's catalogs based on independent testing lab reports.

TABLE JA-8 MINIMUM REQUIREMENTS FOR LED SOURCE SYSTEMS TO QUALIFY AS HIGH EFFICACY

Power Rating per Device Under Test	Minimum Efficacy (Lumens Per Watt)
5 watts or less	30
over 5 watts to 15 watts	40



over 15 watts to 40 watts	50
over 40 watts	60

# Section 119. Mandatory Requirements for Lighting Controls, Ballasts, and Luminaires

## 119 All Mandatory Lighting

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### SECTION 119 – MANDATORY REQUIREMENTS FOR LIGHTING CONTROL DEVICES AND SYSTEMS, BALLASTS, AND LUMINAIRES

~~Any lighting control device, ballast, or luminaire subject to the requirements of Section 119 shall be installed only if the manufacturer has certified to the Commission that the device complies with all of the applicable requirements of Section 119.~~

~~Lighting control devices may be individual devices or systems consisting of two or more components. For control systems consisting of two or more components, such as an Energy Management Control System (EMCS), the manufacturer of the control system shall certify each of the components required for the system to comply with Section 119.~~

~~(a) Any lighting control device or system, ballast, or luminaire subject to the requirements of Section 119 shall meet the following requirements:~~

- ~~1. Shall be installed only if the lighting control device or system, ballast, or luminaire complies with all of the applicable requirements of Section 119.~~
- ~~2. Lighting controls may be individual devices or systems consisting of two or more components.~~
- ~~3. Self Contained Lighting Controls, as defined in Section 101, shall be certified by the Manufacturer in accordance with the Title 20 Appliance Efficiency Regulations.~~
- ~~4. Lighting Control Systems, as defined in Section 101, shall comply with the applicable requirements in Section 119(b).~~
- ~~5. Indicator lights integral to lighting control systems shall consume no more than one watt of power per indicator light.~~

~~(b) (a) All Devices: Instructions for Installation and Calibration. The manufacturer shall provide step-by-step instructions for installation and start-up calibration of the device.~~

~~(b) Indicator Lights. Indicator lights integral to lighting control devices shall consume no more than one watt of power per indicator light.~~

~~(c) Automatic Time Switch Control Devices. Automatic time switch control devices or system shall:~~

- ~~1. Be capable of programming different schedules for weekdays and weekends;~~
- ~~2. Have program backup capabilities that prevent the loss of the device's schedules for at least 7 days, and the device's time and date setting for at least 72 hours if power is interrupted.~~

~~(d) Occupant Sensors, Motion Sensors, and Vacancy Sensors. Occupant sensors, motion sensors, and vacancy sensors shall be capable of automatically turning off all the lights in an area no more than 30 minutes after the area has been vacated, and shall have a visible status signal that indicates that the device is operating properly or that it has failed or malfunctioned. The visible status signal may have an override switch that turns the signal off. In addition, ultrasonic and microwave devices shall have a built-in mechanism that allows calibration of the sensitivity of the device to room movement in order to reduce the false sensing of occupants, and shall comply with either Item 1 or 2 below, as applicable:~~

- ~~1. If the device emits ultrasonic radiation as a signal for sensing occupants within an area, the device shall:~~

~~A. Have had a Radiation Safety Abbreviated Report submitted to the Center for Devices and Radiological Health, Federal Food and Drug Administration, under 21 Code of Federal Regulations, Section 1002.12 (1996), and a copy of the report shall have been submitted to the California Energy Commission; and~~

~~B. Emit no audible sound; and~~

~~C. Not emit ultrasound in excess of the decibel (dB) values shown in TABLE 119-A, measured no more than 5 feet from the source, on axis.~~

~~2. If the device emits microwave radiation as a signal for sensing occupants within the area, the device shall:~~

~~A. Comply with all applicable provisions in 47 Code of Federal Regulations, Parts 2 and 15 (1996), and have an approved Federal Communications Commission Identifier that appears on all units of the device and that has been submitted to the California Energy Commission; and~~

~~B. Not emit radiation in excess of 1 milliwatt per square centimeter measured at no more than 5 centimeters from the emission surface of the device; and~~

~~Have permanently affixed to it installation instructions recommending that it be installed at least 12 inches from any area normally used by room occupants.~~

~~(e) Multi-Level Occupant Sensor. Multi-level occupant sensors shall have an automatic OFF function that turns off all the lights, and either an automatic or a manually controlled ON function capable of meeting all the multi-level and uniformity requirements of Section 131(b) for the controlled lighting. The first stage shall be capable of activating between 30-70 percent of the lighting power in a room either through an automatic or manual action, and may be a switching or dimming system. After that event occurs the device shall be capable of all of the following actions when manually called to do so by the occupant:~~

~~1. Activating the alternate set of lights.~~

~~2. Activating 100 percent of the lighting power.~~

~~3. Deactivating all lights.~~

~~(f) Automatic Daylighting Control Devices. Automatic daylighting control devices used to control lights in daylight zones shall:~~

~~1. Be capable of reducing the power consumption of the general lighting in the controlled area by at least two thirds in response to the availability of daylight; and~~

~~2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz, and without causing premature lamp failure; and~~

~~3. If the devices reduce lighting in control steps, incorporate time-delay circuits to prevent cycling of light level changes of less than 3 minutes and have a manual or automatic means of adjusting the deadband to provide separation of on and off points for each control step; and~~

~~4. If the device is placed in calibration mode, automatically restore its time-delay settings to normal operation programmed time delays after no more than 60 minutes; and~~

~~5. Have a setpoint control that easily distinguishes settings to within 10 percent of full scale adjustment; and~~

~~6. Have a light sensor that has a linear response with 5 percent accuracy over the range of illuminance measured by the light sensor; and~~

~~7. Have a light sensor that is physically separated from where calibration adjustments are made, or is capable of being calibrated in a manner that the person initiating calibration is remote from the sensor during calibration to avoid influencing calibration accuracy.~~

~~(g) Interior Photosensors. Interior photosensor shall not have a mechanical slide cover or other device that permits easy unauthorized disabling of the control, and shall not be incorporated into a wall-mounted occupant sensor.~~

~~(h) Multi-level Astronomical Time-switch Controls. Multi-level astronomical time-switch controls used to control lighting in daylight zones shall:~~

- ~~1. Contain at least 2 separately programmable steps per zone that reduces illuminance in a relatively uniform manner as specified in Section 131(b); and~~
- ~~2. Have a separate offset control for each step of 1 to 240 minutes; and~~
- ~~3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and~~
- ~~4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and~~
- ~~5. Display date/time, sunrise and sunset, and switching times for each step; and~~
- ~~6. Have an automatic daylight savings time adjustment; and~~
- ~~7. Have automatic time switch capabilities specified in Section 119(c).~~

~~(i) Outdoor Astronomical Time-switch Controls. Outdoor astronomical time-switch controls used to control outdoor lighting as specified in Section 132(c) shall:~~

- ~~1. Contain at least 2 separately programmable steps per function area; and~~
- ~~2. Have the ability to independently offset the on and off times for each channel by 0 to 99 minutes before or after sunrise or sunset; and~~
- ~~3. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within 5 minutes per year; and~~
- ~~4. Store astronomical time parameters (used to develop longitude, latitude, time zone) for at least 7 days if power is interrupted; and~~
- ~~5. Display date/time, sunrise and sunset; and~~
- ~~6. Have an automatic daylight savings time adjustment; and~~
- ~~7. Have automatic time switch capabilities specified in Section 119(c).~~

~~(j) Manual-On Occupant Sensor (Residential) (Vacancy Sensor). A residential manual-on-occupant sensor (also known as a vacancy sensor) used to comply with Section 150(k) shall be a device or system which meets all of the following requirements:~~

- ~~1. Turns off the lighting automatically within 30 minutes or less after the room has been vacated in response to the absence of occupants in the room; and~~
- ~~2. Has a visible status signal in accordance with Section 119(d); and~~
- ~~3. Shall not turn on the lighting automatically, except the sensor shall have a grace period of 15 seconds to 30 seconds to turn on the lighting automatically after the sensor has timed out; and~~
- ~~4. Shall not have an override switch that disables the occupant sensor; and~~
- ~~5. Shall not have an override switch that converts the sensor from a manual-on to an automatic-on system.~~

~~(k) Dimmers. Dimmers used to control lighting shall:~~

- ~~1. Be capable of reducing power consumption by a minimum of 65 percent when the dimmer is at its lowest light level; and~~
- ~~2. If the device is a dimmer controlling incandescent or fluorescent lamps, provide electrical outputs to lamps for reduced flicker operation through the dimming range, so that the light output has an amplitude modulation of less than 30 percent for frequencies less than 200 Hz, and without causing premature lamp failure; and~~
- ~~3. Be listed by a rating lab recognized by the International Code Council (ICC) as being in compliance with Underwriters Laboratories Standards; and~~

~~4. If the device is a wall box dimmer designed to be used in a three or more way circuit with non-dimmable switches, the level set by the dimmer shall not be overridden by any of the switches in the circuit. The dimmer and all of the switches in the circuit shall have the capability of turning lighting OFF if it is ON, and turning lighting ON to the level set by the dimmer if the lighting is OFF. Any wall box dimmer that is connected to a system with an emergency override function shall be controlled by the emergency override.~~

~~5. If the device is a stepped dimmer, it shall include an off position to turn lights completely off.~~

(b) All Lighting Control Systems listed in this subsection shall meet the requirements listed below, and shall comply with the Lighting Control Acceptance requirements in accordance with Section 134.

#### 1. Time-Switch Controls

- A. Automatic Time Switch Controls, in addition to meeting the program backup requirements for Automatic Time Switch Control devices in the Title 20 Appliance Efficiency Regulations, shall include manually operated override switching controls in the system in accordance with Section 131(d)2.
- B. Astronomical Time-Switch Controls shall meet all of the requirements for Astronomical Time-Switch Control devices in the Title 20 Appliance Efficiency Regulations except that any manually operated override switching controls shall meet the requirements of Section 119(b)1A.
- C. Multi-Level Astronomical Time Switch Controls, in addition to meeting all of the requirements for an Astronomical Time-Switch Controls, shall include at least 2 separately programmable steps per zone.

#### 2. Daylighting Controls

- A. Automatic Daylighting Controls, in addition to meeting all of the requirements for Automatic Daylighting Control devices in the Title 20 Appliance Efficiency Regulations, shall
  - i. Be capable of reducing the power consumption of the general lighting in the controlled area as required for compliance with Section 131; and
  - ii. If the control includes a dimmer controlling incandescent or fluorescent lamps, shall meet the requirements Section 119 (b)(3)
  - iii. If the system reduces lighting in control steps, incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes and have a manual or automatic means of adjusting the deadband to provide separation of ON and OFF points for each control step.
- B. Photo Controls shall meet all of the requirements for Photo Control devices in the Title 20 Appliance Efficiency Regulations.

3. Dimmer Controls shall meet all of the requirements for Dimmer Control devices in the Title 20 Appliance Efficiency Regulations.

4. Occupancy, Motion, and Vacancy Sensor Controls in addition to meeting all of the applicable requirements for Occupant Sensing devices in the Title 20 Appliance Efficiency Regulations, shall meet the following requirements as applicable:

- A. Occupant Sensor, Dimmer used to qualify for a Power Adjustment Factor in accordance with Section 146(a)2D shall meet all of the applicable requirements for a Dimming sensor device in the Title 20 Appliance Efficiency Regulations.
- B. Multi-Level Occupant Sensor, Partial-ON used to qualify for a Power Adjustment Factor in accordance with Section 146(a)2D shall meet all of the applicable requirements for Partial-On Occupant Sensor device in the Title 20 Appliance Efficiency Regulations.
- C. Multi-Level Occupant Sensor, Partial-OFF used to qualify for a Power Adjustment Factor in accordance with Section 146(a)2D shall meet all of the applicable requirements for Partial OFF Occupant Sensor device in the Title 20 Appliance Efficiency Regulations.
- D. Vacancy Sensor shall meet all of the applicable requirements for a Vacancy sensor device in the Title 20 Appliance Efficiency Regulations.

**(4c) Track Lighting Integral Current Limiter.** Integral current limiters for line-voltage track lighting shall be certified to the Energy Commission as meeting the following requirements, or complying with a method approved by the Executive Director:

1. Be designed so that the integral current limiter housing is permanently attached to the track so that the track will be irreparably damaged if the integral current limiter housing were to be removed after installation into the track; and
2. Have the volt-ampere (VA) rating of the current limiter clearly marked on the circuit breaker visible for the building officials' field inspection without opening coverplates, fixtures, or panels, and also on a permanent factory-installed label on a non-removable base-plate inside the wiring compartment; and
3. Employ tamper resistant fasteners for the cover to the wiring compartment; and
4. Have a conspicuous permanent factory installed label affixed to the inside of the wiring compartment warning against removing, tampering with, rewiring, or bypassing the device.

5. Shall comply with the Lighting Control Acceptance requirements in accordance with Section 134

**(d) Supplemental Overcurrent Protection Panel.** Supplemental Overcurrent Protection Panels used in accordance with Section 130(e)3B(iv) shall comply with the Lighting Control Acceptance requirements in accordance with Section 134

**(me) Residential High Efficacy LED Lighting Systems.** To qualify as high efficacy for compliance with Section 150(k), a high efficacy LED luminaire, or LED light engine with integral heat sink shall meet the minimum efficacy requirements in TABLE 150-C and luminaire power shall be determined as specified by Section 130(d)5.

To qualify as high efficacy for compliance with the residential lighting Standards in Section 150(k), a residential luminaire using Light Emitting Diode (LED) as light source, the LED light engine (defined as in ANSI/IESNA RP-16-10) used in the luminaire shall be certified to the Energy Commission according to Reference Joint Appendix JA-8. LED light sources not certified to the Energy Commission shall be classified as low efficacy for compliance with Section 150(k).

**(nf) Ballasts for Residential Recessed Luminaires.** To qualify as high efficacy for compliance with Section 150(k), any ballast in a residential recessed luminaire shall meet all of the following conditions:

1. Be rated by the ballast manufacturer to have a minimum rated life of 30,000 hours when operated at or below a specified maximum case temperature. This maximum ballast case temperature specified by the ballast manufacturer shall not be exceeded when tested in accordance to UL 1598 Section 19.15; and
2. Have a ballast factor of not less than 0.90 for non-dimming ballasts and a ballast factor of not less than 0.85 for dimming ballasts.

**(og) Dimmable Fluorescent Ballasts for Power Adjustment Factor.** To qualify for the Power Adjustment Factor in Section 146(a)2 and Error! Reference source not found, TABLE 146-C, ballasts for T5 and T8 linear fluorescent lamps shall be electronic, dimmable, and shall meet the minimum Relative System Efficiency (RSE) in Error! Reference source not found, TABLE 146-D.

**TABLE 119-A ULTRASOUND MAXIMUM DECIBEL VALUES**

<b>MIDFREQUENCY OF SOUND PRESSURE THIRD-OCTAVE BAND (in kHz)</b>	<b>MAXIMUM dB LEVEL WITHIN THIRD-OCTAVE BAND (in dB reference 20 micropascals)</b>
Less than 20	80
20 or more to less than 25	105
25 or more to less than 31.5	110
31.5 or more	115



# Section 130 Lighting Controls and Equipment - General

## SECTION 130 – LIGHTING CONTROLS AND EQUIPMENT—GENERAL

(a) Except as provided in Subsections ~~(b) and (c)~~ (b through d), the design and installation of all lighting systems and equipment in nonresidential, high-rise residential, hotel/motel buildings, and outdoor lighting subject to Title 24, Part 6, shall comply with the applicable provisions of Sections 131 through 139. All lighting controls and equipment shall be installed in accordance with the manufacturer's instructions.

(b) **Indoor Lighting in High-rise Residential Dwelling Units and Hotel/Motel Guest Rooms.** The design and installation of all lighting systems, lighting controls and equipment in high-rise residential dwelling units and in hotel/motel guest rooms shall comply with the applicable provisions of Section 150(k).

(c) **Outdoor Lighting for High-rise Residential Dwelling Units and Hotel/Motel Guest Rooms.** Outdoor lighting that is permanently attached to the building, and is separately controlled from the inside of a high-rise residential dwelling unit or guest room shall comply with the applicable provisions of Section 150(k) ~~13~~.

(d) **Indoor Lighting in Fire Stations.** Lighting systems in fire station staff housing rooms and living quarters shall comply with the applicable provisions of Section 150(k).

~~(d)~~ **Luminaire power.** Luminaire wattage shall be determined as follows, or by a method approved by the Executive Director:

1. ~~The~~ The wattage of luminaires with line voltage lamp holders, other than GU-24 as determined according to Section 130 ~~(ef)~~, and not containing permanently installed ballasts or transformers shall be determined as follows:

A. For other than recessed luminaires, the maximum relamping rated wattage of the luminaire, as listed on a permanent, pre-printed, factory-installed label, as specified by UL 1598.

B. For recessed luminaires, the larger of the maximum relamping rated wattage of the luminaire, as listed on a permanent, pre-printed, factory-installed label, as specified by UL 1598, or the following:

i. ~~50~~ 50 watts per socket for luminaires with housings or trims with an aperture diameter less than 5 inches regardless of mounting height; or

ii. ~~50~~ 50 watts per socket for luminaires with housings or trims with an aperture diameter of greater than or equal to 5 inches and a mounting height of 11 feet or less; or

iii. ~~60~~ 60 watts per socket for luminaires with housings or trims with an aperture diameter of greater than or equal to 5 inches and a mounting height of greater than 11 feet but less than 15 feet; or

iv. ~~75~~ 75 watts per socket for luminaires with housings or trims with an aperture diameter of greater than or equal to 5 inches and a mounting height of 15 feet or more.

C. ~~For~~ For luminaires designed to accommodate a variety of trims or modular components that allow the conversion between screw-based and pin-based sockets without changing the luminaire housing or wiring, the highest wattage designated by the correlated marking on a permanent, pre-printed, factory-installed label on the luminaire housing shall be used.

D. ~~For~~ For luminaires with line voltage lamp holders, the factory-installed wattage label shall not consist of peel-off or peel-down layers or other methods which allow the rated wattage to be changed after the luminaire has been shipped from the manufacturer.

2. ~~The~~ The wattage of luminaires with permanently installed or remotely installed ballasts shall be the operating input wattage of the rated lamp/ballast combination published in ballast manufacturer's catalogs based on independent testing lab reports as specified by UL 1598. The wattage of a compact fluorescent or high intensity discharge luminaire that can accommodate a range of wattages without changing the luminaire housing, ballast,



or wiring shall be the larger of the installed wattage, or the average wattage of the lamp/ballast combinations for which the luminaire is rated.

3. ~~\_\_\_\_\_~~ The wattage of line-voltage lighting track and plug-in busway which allows the addition or relocation of luminaires without altering the wiring of the system shall be determined by one of the following methods:

A. The wattage of line voltage busway and track rated for more than 20 amperes shall be the total volt-ampere rating of the branch circuit feeding the busway and track.

B. The wattage of line voltage busway and track rated for 20 amperes or less shall be determined by one of the following methods:

i. ~~\_\_\_\_\_~~ The volt-ampere rating of the branch circuit feeding the track or busway; or

ii. ~~\_\_\_\_\_~~ The higher of the rated wattage of all of the luminaires included in the system, where wattage is determined according to Section 130(~~de~~)1, 2, 4, 5, or 6 as applicable, or 45 watts per linear foot; or

iii. ~~\_\_\_\_\_~~ When using an integral current limiter, the higher of the volt-ampere rating of an integral current limiter controlling the track or busway, or 12.5 watts per linear foot of track or busway, provided that the integral current limiter complies with the applicable requirements in Section 119(4), and an integral current limiter shall be used only if it complies with the applicable Acceptance requirements in accordance with Section 134; or

iv. ~~\_\_\_\_\_~~ When using a dedicated track lighting supplementary overcurrent protection panel, the sum of the ampere (A) rating of all of the overcurrent protection devices times the branch circuit voltages, and a dedicated track lighting supplementary overcurrent protection panel shall be used only if it complies with the applicable Acceptance requirements in accordance with Section 134. The panel shall meet all of the following requirements:

a. Be listed as defined in Section 101; and

b. Be used only with line voltage track lighting; and

c. Be permanently installed in an electrical equipment room, or permanently installed adjacent to the lighting panel board providing supplementary overcurrent protection for the track lighting circuits served by the supplementary over current protection panel; and

d. Be prominently labeled "NOTICE: This Panel for Track Lighting Energy Code Compliance Only. The overcurrent protection devices in this panel shall only be replaced with the same or lower amperage. No other overcurrent protective device shall be added to this panel. Adding to, or replacement of existing overcurrent protective device(s) with higher continuous ampere rating, will void the panel listing and require re-submittal and re-certification of California Title 24, Part 6 compliance documentation."

4. The wattage of luminaires or lighting systems with permanently installed or remotely installed transformers shall be determined as follows:

A. For low-voltage luminaires that are not track lighting, and other low-voltage luminaires that do not allow the addition of lamps, lamp holders, or luminaires without rewiring, shall be, tThe rated wattage of the lamp/transformer combination, listed on a permanent, pre-printed, factory-installed label, as specified by UL 2108; and

B. For low-voltage track lighting, and other low-voltage lighting systems which allow the addition of lamps, lamp holders, or luminaires without rewiring, shall be the maximum rated wattage of the transformer.

~~BC~~. For luminaires or lighting systems with transformers rated greater than 53 watts, the factory-installed wattage label shall not consist of peel-off or peel-down layers or other methods which allow the rated wattage to be changed after the luminaire or lighting system has been shipped from the manufacturer.

5. ~~\_\_\_\_\_~~ ~~T~~The wattage of light emitting diode (LED) Luminaires, or LED Light Engines with Integral Heat Sink shall be the maximum rated input wattage of the system when tested in accordance with the applicable provisions of Reference Joint Appendix JA8. The maximum rated input wattage shall be listed on a permanent, pre-printed, factory-installed label.

6. The wattage of all other miscellaneous lighting equipment shall be the maximum rated wattage of the lighting equipment, or operating input wattage of the system, listed on a permanent, pre-printed, factory-installed label, or published in manufacturer's catalogs, based on independent testing lab reports as specified by UL 1574 or UL 1598.

~~(e) GU 24 Lamps, Luminaires, and Adaptors. GU 24 lamps, luminaires, and adaptors installed in California shall meet the following requirements:~~

~~1. Lamps with GU 24 bases shall have a minimum efficacy no lower than specified in Table 150 C.~~

~~2. The wattage of luminaires with GU 24 lamp holders shall be the operating input wattage as listed on a permanent, pre-printed, factory-installed label on the luminaire housing, as specified by UL. Luminaires with GU 24 lampholders shall not be rated for any lamp or lighting system that has an efficacy lower than specified in Table 150 C3. Luminaires with GU 24 lampholders shall not have modular components allowing conversion to any lamp or lighting system that has an efficacy lower than specified in Table 150 C.~~

~~4. There shall be no adaptors that convert a GU 24 socket or GU 24 lamp holder to any other line voltage socket or lamp holder, or to any lighting system that has an efficacy lower than specified in Table 150 C.~~

(f) **GU-24 Luminaires.** The wattage of luminaires with GU-24 lamp holders shall be the operating input wattage as listed on a permanent, pre-printed, factory-installed label on the luminaire housing, as specified by UL.

(g) **Certified Lighting Controls.** All self-contained lighting controls and lighting control systems installed shall comply with the applicable requirements in Title 20 and Section 119 of Title 24.

# Sections 131 and 132. Indoor and Outdoor Lighting

## Controls131 132 NR Mandatory Lighting

### SECTION 131 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

#### (a) Area Controls.

1. ~~Each area enclosed by ceiling-height partitions shall have one or more independent manual on and off switching controls for all switch leg or control devices. This These switching ~~or control~~ devices shall be:~~

A. Readily accessible; and

B. Located ~~so that a person using the device can see the lights or area in the same room or area with the lighting that is~~ controlled by that switch, ~~or so that the area being lit is annunciated; and~~

EXCEPTION to Section 131(a)1: In malls, auditoriums, retail and wholesale sales floors, industrial facilities, convention centers, and arenas, the switching or control device shall be located so that a person using the device can see the lights or area controlled by that switch, or so that the area being lit is annunciated.

~~C. Manually operated, or automatically controlled by an occupant sensor that meets the applicable requirements of Section 119.~~

2. ~~Other devices may be installed in conjunction with addition to the manual switching or control device provided that they:~~

~~A. Permit the switching or control device to manually turn the lights ON and off OFF in each area enclosed by ceiling-height partitions; and~~

~~B. Reset the mode of any automatic system to normal operation without further action.~~

~~EXCEPTION 1 to Section 131(a): Up to 0.30.2 watts per square foot of lighting in any area within a building that must may be continuously illuminated for reasons of building security, or during occupied times to allow for emergency egress, if:~~

~~A. The area is designated an security or emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Title 24, Part 1; and~~

~~B. The security or egress lighting is not controlled by switches accessible only to unauthorized personnel.~~

#### 3. Separately Switched Lighting Systems

A. General lighting shall be separately switched from all other lighting systems in a space.

B. Floor and wall display, window display, and case display lighting shall each be separately switched on circuits that are 20 amps or less, or shall be controlled in accordance with the applicable provisions of Section 131(e).

~~EXCEPTION 2 to Section 131(a): Public areas with switches that is accessible only to authorized personnel.~~

#### (b) Multi-Level ~~Lighting Controls~~ Controllable Lighting.

The general lighting of any enclosed space 100 square feet or larger, and has a connected lighting load that exceeds 0.80.5 watts per square foot, shall have multi-level controllable lighting complying with the requirements of Table 131-A. lighting controls. Multi-level controls shall have at least one control step that is between 30 percent and 70 percent of design lighting power and allow the power of all lights to be manually turned off. A reasonably uniform level of illuminance shall be achieved by any of the following:

1.—Continuous or stepped dimming of all lamps or luminaires; or

2.—Switching alternate lamps in luminaires, alternate luminaires, and alternate rows of luminaires.

**EXCEPTION 1 to Section 131(b): EXCEPTIONS to Section 131(b):**

1.—~~Lights in corridors~~ Classrooms with a connected general lighting load of 0.7 watts per square foot and less shall have at least one step between 30-70 percent of full rated power.

**EXCEPTION 2 to Section 131(b):**

2.—A space that has only one luminaire with no more than two lamps.

**(c) Daylight Areas.**

1.—Daylight areas shall be defined as follows:

A.—~~DAYLIGHT AREA~~ the total daylight area shall not double count overlapping areas with any primary sidelit daylight area, secondary sidelit daylight area, or skylit daylight area.

B.—~~DAYLIGHT AREA, PRIMARY SIDELIT~~ is the combined primary sidelit area without double-counting overlapping areas. The floor area for each primary sidelit area is directly adjacent to vertical glazing below the ceiling with an area equal to the product of the sidelit width and the primary sidelit depth.

The primary sidelit width is the width of the window plus, on each side, the smallest of:

i.—2 feet; or

ii.—The distance to any 5 feet or higher permanent vertical obstruction.

The primary sidelit depth is the horizontal distance perpendicular to the glazing which is the smaller of:

i.—One window head height; or

ii.—The distance to any 5 feet or higher permanent vertical obstruction.

C.—~~DAYLIGHT AREA, SECONDARY SIDELIT~~ is the combined secondary sidelit area without double-counting overlapping areas. The floor area for each secondary sidelit area is directly adjacent to primary sidelit area with an area equal to the product of the sidelit width and the secondary sidelit depth.

The secondary sidelit width is the width of the window plus, on each side, the smallest of:

i.—2 feet; or

ii.—The distance to any 5 feet or higher permanent vertical obstruction; or

iii.—The distance to any skylit daylight area.

The secondary sidelit depth is the horizontal distance perpendicular to the glazing which begins from one window head height, and ends at the smaller of:

i.—Two window head heights;

ii.—The distance to any 5 feet or higher permanent vertical obstruction; or

iii.—The distance to any skylit daylight area.

D.—~~DAYLIGHT AREA, SKYLIT~~ is the combined daylight area under each skylight without double-counting overlapping areas. The daylight area under each skylight is bounded by the rough opening of the skylight, plus horizontally in each direction the smallest of:

i.—70 percent of the floor-to-ceiling height; or

ii.—The distance to any primary sidelit area, or the daylight area under rooftop monitors; or

iii. ~~The distance to any permanent partition or permanent rack which is farther away than 70 percent of the distance between the top of the permanent partition or permanent rack and the ceiling.~~

2. ~~Luminaires providing general lighting that are in or are partially in the skylit daylight area and/or the primary sidelit daylight area shall be controlled as follows:~~

A. ~~Primary sidelit and skylit daylight areas shall have at least one lighting control that:~~

i. ~~Controls at least 50 percent of the general lighting power in the primary sidelit and skylit daylight areas separately from other lighting in the enclosed space, in a uniform level of illuminance in accordance with Section 131(b).~~

ii. ~~Controls luminaires in primary sidelit areas separately from skylit areas.~~

**EXCEPTION to Section 131(c) 2A:** ~~Primary sidelit and skylit daylight areas that have a combined area totaling less than or equal to 250 square feet within any enclosed space.~~

B. ~~For all skylit daylight areas:~~

i. ~~The skylit daylight area shall be shown on the plans.~~

ii. ~~All of the general lighting in the skylit area shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119.~~

iii. ~~The automatic daylighting control shall be installed in accordance with Section 131(c)2D.~~

**EXCEPTION 1 to Section 131(c)2B:** ~~Where the total skylit daylight area in any enclosed space is less than or equal to 2,500 square feet.~~

**EXCEPTION 2 to Section 131(c)2B:** ~~Skylit daylight areas where existing adjacent structures obstruct direct beam sunlight for at least 6 hours per day during the equinox as calculated using computer or graphical methods.~~

**EXCEPTION 3 to Section 131(c)2B:** ~~When the skylight effective aperture is greater than 4.0 percent, and all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets the requirements of Section 119(h) and that has an override switch that meets the requirements of Section 131(d)2.~~

**EXCEPTION 4 to Section 131(c)2B:** ~~Skylit daylight areas where the effective aperture is less than 0.006. The effective aperture for skylit daylight areas is specified in Section 146(a)2E.~~

C. ~~The primary sidelit area(s) shall be shown on the plans, and the general lighting in the primary sidelit areas shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119 and is installed in accordance with Section 131(c) 2D.~~

**EXCEPTION 1 to Section 131(c) 2C:** ~~Where the total primary sidelit daylight area in any enclosed space has an area less than or equal to 2,500 square feet.~~

**EXCEPTION 2 to Section 131(c) 2C:** ~~Primary sidelit daylight areas where the effective aperture is less than 0.1. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E.~~

**EXCEPTION 3 to Section 131(c) 2C:** ~~Primary sidelit daylight areas where existing adjacent structures are twice as tall as their distance away from the windows.~~

**EXCEPTION 4 to Section 131(c) 2C:** ~~Parking garages.~~

D. ~~Automatic Daylighting Control Device Installation and Operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:~~

i. ~~Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.~~

ii. ~~The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.~~

iii. ~~Automatic daylighting controls shall be multi-level, including continuous dimming, and have at least one control step that is between 50 to 70 percent of rated power of the controlled lighting shall provide multi-level lighting in accordance with Section 131(b).~~

**EXCEPTION 1 to Section 131(c) 2Diii:** Controlled lighting having a lighting power density less than 0.3 W/ft<sup>2</sup>.

**EXCEPTION 2 to Section 131(c) 2Diii:** ~~When skylights are replaced or added to on an existing building with an existing general lighting system.~~

iv. ~~Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.~~

v. ~~When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.~~

**(d) Shut-off Controls.**

1. ~~\_\_\_\_\_~~ In addition to the ~~manual~~ controls installed to comply with Sections 131(a) and (b), for every floor, all indoor lighting systems shall be equipped with separate automatic controls to shut off the lighting when the building is unoccupied. These automatic controls ~~shall meet the requirements of Section 119 and~~ may be an occupant sensor, automatic time switch, signal from another building or system, or other device capable of automatically shutting off the lighting in response to occupancy conditions.

**EXCEPTION 1 to Section 131(d)(c) 1:** Where the lighting system is serving an area that ~~must be continuously lit~~ is in continuous use, 24 hours per day/365 days per year.

**EXCEPTION 2 to Section 131(d)(c) 1:** Lighting in common area corridors, which provide access to guestrooms, and dwelling units of high-rise residential buildings and hotel/motels, ~~and parking garages.~~

**EXCEPTION 3 to Section 131(d)(c) 1:** ~~Up~~ In office buildings, up to 0.30.05 watts per square foot of lighting in any area within a building ~~that must may~~ be continuously illuminated ~~for reasons of building security or emergency egress~~, provided that the area is designated an security or emergency egress area on the plans and specifications submitted to the enforcement agency under Section 10-103(a)2 of Title 24, Part 1.

**EXCEPTION 4 to Section 131(c) 1:** Lighting in stairwells which is not specifically covered in Section 131(c) 5B.

2. Countdown timer switches shall not be used to comply with the automatic shutoff control requirements in Section 131(c) 1.

**EXCEPTION 1 to Section 131(c) 2:** Electrical equipment rooms subject to Article 110.26(D) of the California Electric Code may use a six-hour countdown timer switch, or occupant sensor having a temporary override provided the override resets to the automatic off mode within six hours.

**EXCEPTION 2 to Section 131(c) 2:** Single-stall bathrooms less than 20 square feet, and closets less than 40 square feet may use a countdown timer switch with a maximum setting of five minutes, to comply with Section 131(c) 1.

3. ~~\_\_\_\_\_~~ If an automatic control device, other than an occupant sensor, is installed to comply with Section 131(d)(c) 1, it shall incorporate an override switching device that:

- A. Is readily accessible; and
- B. Is located ~~so that a person using the device can see the lights or the area controlled by that switch, or so that the area being lit is annunciated in accordance with §131(a) 1B;~~ and
- C. Is manually operated; and
- D. Allows the lighting to remain on for no more than 2 hours when an override is initiated; and

**EXCEPTION to Section 131(d)(c) 3D:** In malls, auditoriums, single tenant retail spaces, industrial facilities, and arenas, where captive-key override is utilized, override time may exceed 2 hours.

- E. Controls an area enclosed by ceiling height partitions not exceeding 5,000 square feet.

**EXCEPTION to Section 131(~~d~~)(c)32E:** In malls, auditoriums, single tenant retail spaces, industrial facilities, convention centers and arenas, the area controlled may not exceed 20,000 square feet.

43. — If an automatic time switch control device, other than an occupant sensor, is installed to comply with Section 131(~~d~~)(c)1, it shall incorporate an automatic holiday "shut-off" feature that turns off all loads for at least 24 hours, and then resumes the normally scheduled operation.

**EXCEPTION to Section 131(~~d~~)(c)34:** Retail stores and associated malls, restaurants, grocery stores, churches, and theaters.

54. — Areas where Occupant Sensors are Required for Compliance with Section 131(c)1.

A. In offices 250 square feet or smaller, multipurpose rooms of less than 1000 square feet, and classrooms and conference rooms of any size, lighting shall be ~~equipped-controlled~~ with occupant sensor(s) to automatically shut off all of the lighting. In addition, controls shall be provided that allow the lights to be manually shut off in accordance with Section 131(a) regardless of the sensor status.

B. In corridors, stairwells, aisle ways in warehouses, and open spaces in warehouses. Lighting shall be controlled with occupant sensor(s) that automatically reduce lighting power by at least 50%. Each luminaire shall be controlled by no more than two occupant sensors.

**EXCEPTION to Section 131(c)5B:** In corridors, stairwells, aisle ways in warehouses, and open spaces in warehouses in which the installed lighting power is 80% or less of the value allowed under the Area Category Method, occupant sensors may reduce power by 40%.

C. In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensors, and shall have at least one control step between 20 percent and 50 percent of design lighting power, and shall allow the power of all lights to be manually turned off. A reasonably uniform level of illuminance shall be achieved in accordance with the applicable requirements in Table 131-A

**EXCEPTION to Section 131(c)5C:** Lighting specifically designated for parking garage emergency egress lighting provided that the path of egress is designated on the plans and specifications submitted to the enforcement agency in accordance with Section 10-103(a)2 of Title 24, Part 1

Note: Interior areas of parking garages are classified as indoor lighting for compliance with Section 131(c)5C. Parking areas on the roof of a parking structure are classified as outdoor hardscape and shall comply with the applicable provision in Section 132.

**(d) Automatic Daylighting Controls.**

1. Daylit Zones shall be defined as follows:

A. SKYLIT DAYLIT ZONE is the area on plan within a space, under each skylight, 0.7 times ceiling height in each direction from the edge of the rough opening of the skylight.

B. PRIMARY SIDELIT DAYLIT ZONE is the area on plan within a space, directly adjacent to each vertical glazing, one window head height deep into the space, and window width plus 0.5 times window head height wide on each side of the rough opening of the window.

C. SECONDARY SIDELIT DAYLIT ZONE is the area on plan within a space, directly adjacent to each vertical glazing, two window head heights deep into the space, and window width plus 0.5 times window head height wide on each side of the rough opening of the window.

2. Luminaires providing general lighting that are in or partially in the skylit daylit zones and the primary sidelit daylit zones shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119, is installed in accordance with Section 131(d)2D, and meets the applicable requirements below:

**EXCEPTION 1 to Section 131(d)2:** Rooms in which the total wattage of general lighting that is in, or partially in, a skylit daylit zone and primary sidelit daylight zone is less than 120 Watts

**EXCEPTION 2 to Section 131(d)2:** Rooms which have a total glazing area of less than 24 feet

**EXCEPTION 2 to Section 131(d)2:** Parking garages complying with Section 131(d)3.

A. All skylit daylit zones and primary sidelit daylit zones shall be shown on plan.

B. Luminaires in the skylit daylit zone shall be controlled separately from those in the primary sidelit daylit zones

C. Luminaires that fall in a skylit and primary sidelit daylit zone shall be controlled as part of the skylit daylit zone

D. Automatic Daylighting Control Device Installation and Operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:

i. ~~——~~Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.

ii. ~~——~~The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.

iii. ~~——~~Automatic daylighting controls shall be multi-level, including continuous dimming, and have at least the number of control steps specified in Table 131-A

**EXCEPTION 1 to Section 131(d)2Diii:** Controlled lighting having a lighting power density less than 0.3 W/ft<sup>2</sup>.

**EXCEPTION 2 to Section 131(d)2Diii:** When skylights are replaced or added to on an existing building ~~into room or area where there is an~~ existing general lighting system.



iv. ~~Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.~~

v. ~~When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.~~

3. Parking Garage Daylighting Requirements. Luminaires providing general lighting in a space with at least 36 square feet of vertical glazing or opening, that are in or partially in the primary and secondary sidelit zones or skylit zone, shall be controlled independently by an automatic daylighting device that meets the applicable requirements of Section 119, is installed in accordance with Section 131(d)3D, and meets the following requirements as applicable:

A. All primary and secondary sidelit and skylit zones shall be shown on plan.

B. Luminaires in the skylit daylight zone shall be controlled separately from those in the primary sidelit daylight zones

C. Luminaires that are in both a skylit and primary sidelit daylight zone shall be controlled as part of the skylit daylight zone.

D. Automatic Daylighting Control Device Installation and Operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:

i. Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.

ii. The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level

iii. Automatic daylighting controls shall be multi-level, continuous dimming, or on-off switching

iv. Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.

v. When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 250 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be zero.

EXCEPTION 1 to Section 131(d)3: Luminaires located in or partially in the daylight adaptation (transition) zone, and luminaires on dedicated ramps (ramps without parking)

EXCEPTION 2 to Section 131(d)3: The total wattage of the general lighting that is in, or partially in, the primary and secondary sidelit and skylit daylight zones is less than 60 watts

~~(e) Automatic Controls~~**EMCS Required for When Using Tailored Method.** ~~(e) Display Lighting.~~ ~~Floor and wall display, window display, and case display lighting shall each be separately switched on circuits that are 20 amps or less.~~

~~When the Tailored Method in Section 146 is used for calculating allowed indoor lighting power density, the general lighting shall be controlled separately from the display, ornamental, and display case lighting. When using the Tailored Method of Compliance, all lighting within the tailored spaces shall be controlled by an Energy Management Control System (EMCS), with lighting for floor and wall display, window display, casework, specialty, ornamental, and special effects lighting all separately switched from the general lighting system.~~

**(f) Demand Responsive Lighting Controls.**

**g Controls.** ~~Demand responsive automatic lighting controls that uniformly reduce lighting power consumption by a minimum of 15 percent shall be installed in retail buildings with sales floor areas greater than 50,000 square feet.~~

1. In buildings larger than 10,000 square feet, the lighting in all spaces required to meet Section 131(b) shall be capable of being set to a level between OFF and full ON as described in Table 131-A by a demand responsive control.

**EXCEPTION to Section 131(gf)1:** Buildings where more than 50 percent of the lighting power is controlled by daylighting controls.

Luminaires that are not addressable and luminaires receiving a dimming signal from a device other than a demand responsive lighting control (for example photocontrols or wall dimmer).

2. A DEMAND RESPONSE SIGNAL shall conform to a nationally recognized open communication standard. Acceptable standards include those defined by groups such as the Organization for the Advancement of Structured Information Standards (OASIS), Energy Interoperation Technical Committee (aka Energy InterOp and OpenADR) or the ZigBee Alliance (aka Smart Energy profile).

**-(g) Circuit Controls for Receptacles Used for Task Lighting.** In all buildings, both controlled and uncontrolled receptacles shall be provide in each private office, open office space, conference room, kitchen, and copy room. Controlled receptacles will allow automatic shut off control of connected task lighting and plug loads. Controlled receptacles shall meet the following requirements:

1. Electric circuits serving controlled receptacles shall be equipped with automatic shut-off controls following the requirements prescribed in section 131(c) for general lighting; and

2. At least one controlled receptacle shall be installed within 1 foot from each uncontrolled receptacle or a split-wired duplex receptacle with one controlled and one uncontrolled recptacle shall be installed; and

3. Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles, and

4. For open office spaces, controlled circuits shall be provided and marked to support installation and configuration of office furniture with receptacles that comply with section 131(g)1, 2, and 3.

Table 131-A Proposed in CASE report.

Light Source Controllability and Uniformity Requirements

<u>Luminaire Type</u>	<u>Minimum Required Control Steps:</u>	<u>A reasonably uniform level of illuminance shall be achieved by:</u>
<u>Incandescent, halogen, and LED lamps and LED lighting systems</u>	<u>Continuous dimming - 10%-100% of Full Power</u>	<u>Continuous dimming</u>
<u>Fluorescent linear (including U-bent) lamps &gt; 13 watts; induction lamps &gt;25 watts</u>	<u>Full <sup>1</sup>, High <sup>2</sup>, Medium <sup>3</sup>, Low <sup>4</sup></u>	<u>Stepped dimming, continuous dimming, switching alternate lamps in a luminaire <sup>5</sup></u>
<u>Fluorescent CF pin based <sup>6</sup> &gt; 20 watts and Fluorescent GU-24 based &gt; 20 watts</u>	<u>Continuous dimming 20 – 100% of full power</u>	<u>Continuous dimming</u>
<u>Linear fluorescent lamps 13 watts and less, Fluorescent CF pin based <sup>6</sup> 20 watts and less, and Fluorescent GU-24 20 watts and less</u>	<u>One step between 30-70 percent of rated power</u>	<u>Stepped dimming, continuous dimming, switching alternate lamps, switching alternate luminaires</u>
<u>HID and Other Light Sources</u>	<u>One step between 50-70 percent of rated power</u>	<u>Stepped dimming, Continuous dimming, Switching alternate lamps in a luminaire <sup>7</sup></u>
<u>1. Full: full rated input power of ballast and lamp, corresponding to maximum ballast factor</u> <u>2. High: between 80% and 85% of rated power</u> <u>3. Medium: between 50% and 70% of rated power</u> <u>4. Low: between 20% and 40% of rated power</u> <u>5. Luminaires with at least four lamps illuminating the same area and in the same manner.</u> <u>6. Includes, twin tube, multiple twin tube, long twin tube, and spiral lamps</u> <u>7. Luminaires with at least three lamps illuminating the same area and in the same manner.</u>		

ALTERNATIVE CEC STAFF PROPOSED TABLE 131-A

MULTI-LEVEL LIGHTING CONTROLS AND UNIFORMITY REQUIREMENTS

<u>Luminaire Type</u>	<u>Minimum Required Control Steps</u> <u>(% of full rated power <sup>1</sup>)</u>				<u>Uniform level of illuminance shall</u> <u>be achieved by:</u>
<u>Line-voltage sockets except GU-24</u> <u>Low-voltage incandescent systems</u> <u>LED luminaires and LED source systems</u> <u>GU-24 rated for LED</u>	<u>Continuous dimming</u> <u>10-100%</u>				<u>Continuous dimming</u>
<u>GU-24 sockets rated for fluorescent &gt; 20 watts</u> <u>Pin-based compact fluorescent &gt; 20 watts <sup>2</sup></u>	<u>Continuous dimming</u> <u>20-100%</u>				<u>Continuous dimming</u>
<u>GU-24 sockets rated for fluorescent ≤ 20 watts</u> <u>Pin-based compact fluorescent ≤ 20 watts <sup>2</sup></u> <u>Linear fluorescent and U-bent fluorescent ≤ 13 watts</u>	<u>Minimum one step between</u> <u>30-70%</u>				<u>Stepped dimming, or</u> <u>Continuous dimming, or</u> <u>Switching alternate lamps in a luminaire</u>
<u>Linear fluorescent and U-bent fluorescent &gt; 13 watts</u>	<u>Minimum one step in each range:</u>				<u>Stepped dimming, or</u> <u>Continuous dimming, or</u> <u>switching alternate lamps in a luminaire <sup>4</sup></u>
	<u>20-40%</u>	<u>50-70%</u>	<u>80-85%</u>	<u>100%</u>	
<u>Track Lighting</u>	<u>Minimum one step between</u> <u>30 – 70%</u>				<u>Step dimming, or</u> <u>Continuous dimming, or</u> <u>Switching of one circuit in a two circuit track</u>
<u>HID</u> <u>Induction &gt; 25 watts</u> <u>Other light sources</u>	<u>Minimum one step between</u> <u>50 - 70%</u>				<u>Stepped dimming, or</u> <u>Continuous dimming, or</u> <u>Switching alternate lamps in a luminaire <sup>3</sup></u>
<u>1. Full rated input power of ballast and lamp, corresponding to maximum ballast factor</u> <u>2. Includes, twin tube, multiple twin tube, and spiral lamps</u> <u>3. Luminaires with at least three lamps illuminating the same area and in the same manner.</u> <u>4. Luminaires with at least four lamps illuminating the same area and in the same manner.</u>					

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## SECTION 132 – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT

- (a) **Outdoor Lighting.** All permanently installed incandescent outdoor luminaires ~~employing lamps~~ rated over 100 watts shall ~~either: have a lamp efficacy of at least 60 lumens per watt; or~~ be controlled by a motion sensor.

**EXCEPTION 1 to Section 132(a):** Lighting required by a health or life safety statute, ordinance or regulation, including but not limited to emergency lighting.

~~EXCEPTION 2 to Section 132(a): Lighting used in or around swimming pools, water features or other locations subject to Article 680 of the California Electrical Code.~~

~~EXCEPTION 3 to Section 132(a): Searchlights.~~

~~EXCEPTION 4 to Section 132(a): Theme lighting for use in theme parks.~~

~~EXCEPTION 5 to Section 132(a): Lighting for film or live performances.~~

~~EXCEPTION 6 to Section 132(a): Temporary outdoor lighting.~~

~~EXCEPTION 7 to Section 132(a): Light emitting diode, light emitting capacitors, neon and cold cathode lighting.~~

~~EXCEPTION 8 to Section 132(a): Sign lighting~~

- (b) **Luminaire Cutoff Requirements.** All outdoor luminaires that use lamps rated greater than ~~475~~150 watts in hardscape areas including parking lots, building entrances, sales and non-sales canopies, and all outdoor sales areas shall be designated Cutoff for light distribution. To comply with this requirement, the luminaire shall be rated Cutoff in a photometric test report that includes any tilt or other non-level mounting condition of the installed luminaire. Cutoff is a luminaire light distribution classification where the candela per 1000 lamp lumens does not numerically exceed 25 at or above a vertical angle of 90 degrees above nadir, and 100 at or above a vertical angle of 80 degrees above nadir. Nadir is in the direction of straight down, as would be indicated by a plumb line. 90 degrees above nadir is horizontal. 80 degrees above nadir is 10 degrees below horizontal.

**EXCEPTION 1 to Section 132(b):** Signs.

**EXCEPTION 2 to Section 132(b):** Lighting for building facades, public monuments, statues, and vertical surfaces of bridges.

**EXCEPTION 3 to Section 132(b):** Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.

~~EXCEPTION 4 to Section 132(b): Temporary outdoor lighting.~~

~~EXCEPTION 5 to Section 132(b): Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of the California Electrical Code.~~

**EXCEPTION 64 to Section 132(b):** Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:

- A. Where the existing luminaire does not meet the luminaire cutoff requirements in Section 132(b); and
- B. Spacing between existing poles is greater than 6 times the mounting height of the existing luminaires; and
- C. Where no additional poles are being added to the site; and
- D. Where new wiring to the luminaires is not being installed; and
- E. Provided that the connected lighting power wattage is not increased.

(c) **Controls for Outdoor Lighting**

1. All permanently installed outdoor lighting shall be controlled by a photocontrol or astronomical time switch that automatically turns off the outdoor lighting when daylight is available.

**EXCEPTION to Section 132(c)1:** Lighting in tunnels, and large permanently covered outdoor areas that ~~require illumination~~ are subject to occupancy during daylight hours 24 hours per day/365 days per year.

2. ~~For lighting of building facades, parking lots, sales and non-sales canopies, all outdoor sales areas, and student pick-up/drop-off zones where two or more luminaires are used, an automatic time switch shall be installed that is capable of:~~

~~(A) turning off the lighting when not needed and~~

~~(B) reducing the lighting power (in watts) by at least 50 percent but not exceeding 80 percent or providing continuous dimming through a range that includes 50 percent through 80 percent reduction.~~

~~**EXCEPTION 1 to Section 132(c)2:** Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.~~

~~**EXCEPTION 2 to Section 132(c)2:** Lighting for steps or stairs that require illumination during daylight hours.~~

~~**EXCEPTION 3 to Section 132(c)2:** Lighting that is controlled by a motion sensor and photocontrol.~~

2. All permanently installed outdoor lighting shall be circuited and switched to turn off the independent of other electrical loads

3. For all permanently installed outdoor lighting where two or more luminaires are used, an automatic lighting control system shall be installed that is capable of reducing the lighting power (in watts) by at least 50 percent or providing continuous dimming through a range that includes at least 50 percent through 80 percent reduction. The control system shall meet at least one of the following requirements:

A. The lighting is circuited in controllable zones, step dimming, or dimming control system.

B. An activity sensing system shall be capable of switching, step dimming, or dimming based on human activity, and shall employ auto-on functionality.

**EXCEPTION 1 to Section 132(c)3:** Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting

**EXCEPTION 2 to Section 132(c)3:** Lighting equipment for Outdoor Sales Frontage, Outdoor Sales Lots, Outdoor Sales Canopies, Vehicle Service Station Canopies, Vehicle Service Station Hardscape and Uncovered Service Station Fuel Dispensers, provided a control system is installed that is capable of reducing the lighting power (in watts) by 80 percent to 100 percent, and a minimum of one of the following conditions exists:

A. The lighting is circuited in controllable zones, step dimming, or dimming control system.

B. An activity sensing system capable of switching, step dimming, or dimming based on human activity, employing auto-on functionality.

C. No additional poles are added to the site.

D. No new wiring is installed.

E. Connected lighting power wattage is not increased.

4. Permanently installed outdoor area meeting all of the following requirements shall be controlled with a motion sensing control in addition to photocell: Is mounted 24 feet or lower; is installed above grade or above a finished floor; and is on the building façade, wall, canopy, or pole.

- A. The control system shall be capable of reducing the lighting power (in watts) by at least 50 percent but not exceeding 80 percent or providing continuous dimming through a range that includes 50 percent through 80 percent reduction; and shall and shall employ auto-on functionality.

**EXCEPTION 1 to Section 132(c)4:** Lighting required by a health or life safety statute, ordinance, or regulation, including but not limited to, emergency lighting.

**EXCEPTION 2 to Section 132(c)4:** Pole mounted pedestrian lighting and decorative pedestrian poles mounted below 13 feet AND below 85 lamp watts per pole.

**EXCEPTION 3 to Section 132(c)4:** Area lighting equipment mounted below 54 inches, luminaires rated by the manufacturer for a maximum lamp wattage of 26 watts, and linear luminaires rated by the manufacturer for less than 4 watts per linear foot of luminaire.

EXCEPTION 4 to Section 132(c)4: Lighting equipment installed only for the purpose of illuminating the building façade, and decorative lighting that is not useful for human way-finding or navigation.

EXCEPTION 5 to Section 132(c)4: Lighting equipment associated with Outdoor Sales Frontage, Outdoor Sales Lots, Outdoor Sales Canopies, Vehicle Service Station Canopies, Vehicle Service Station Hardscape and Uncovered Service Station Fuel Dispensers allowances.

~~EXCEPTION 4 to Section 132(c)2: Lighting for facilities that have equal lighting requirements at all hours and are designed to operate continuously.~~

~~EXCEPTION 5 to Section 132(c)2: Temporary outdoor lighting.~~

~~EXCEPTION 6 to Section 132(c)2: Signs.~~

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# Section 133 Sign Lighting Controls and Section 134 Acceptance Requirements

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## SECTION 133 – SIGN LIGHTING CONTROLS

(a) **Controls for All Signs.** All signs with permanently connected lighting shall meet the requirements of Section 133 below:

1. ~~Automatic Time Switch Control~~**Indoor Signs.** All indoor signs ~~with permanently connected~~ lighting shall be controlled with an automatic time switch control or astronomical time switch control ~~that complies with the applicable requirements of Section 119.~~

2. ~~Photocontrol or outdoor astronomical time switch control~~**Outdoor Signs.**

A. All outdoor signs lighting shall be controlled with a photocontrol or ~~outdoor~~ astronomical time switch control.

**EXCEPTION to Section 133(a)2A:** Outdoor signs in tunnels, and signs in large permanently covered outdoor areas ~~that require illumination during daylight hours; that must be continuously lit, 24 hours per day/365 days per year.~~

~~3. B. Dimming.~~ All outdoor signs lighting that is on both day and night shall be controlled with a dimmer that provides the ability to automatically reduce s sign power by a minimum of 65 percent during nighttime hours.

**EXCEPTION 1 to Section 133(a)3:** Signs that are illuminated for less more than 1 hour ~~per day~~ during daylight hours are considered to be on both day and night.

**EXCEPTION 2 to Section 133(a)32B:** Outdoor signs in tunnels and large covered areas that require even illumination ~~during daylight hours~~ both day and night.

**EXCEPTION 3 to Section 133(a)3:** Metal halide, high pressure sodium, cold cathode, and neon lamps used to illuminate signs or parts of signs.

3. Demand Responsive Electronic Message Center Control.~~EXCEPTION 4 to Section 133(a)3: Demand Responsive Electronic Message Center Control~~ An Electronic Message Center (EMC) having a new connected lighting power load greater than 15 kW shall have a control installed that is capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal that is sent out by the local utility.

**EXCEPTION 5 to Section 133(a)43:** EMCs required by a health or life safety statute, ordinance, or regulation, including but not limited to exit signs and traffic signs.

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## SECTION 134 – REQUIRED NONRESIDENTIAL LIGHTING CONTROL ACCEPTANCE

(a) **Lighting Control Acceptance.** Before an occupancy permit is granted for a new building or space, or a new lighting system serving a building, space, or site is operated for normal use, all indoor and outdoor lighting controls serving the building, space, or site shall be certified as meeting the Acceptance Requirements for Code Compliance. A Certificate of Acceptance shall be submitted to the enforcement agency under Section 10-103(a) of Title 24, Part 1, that:

1. Certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of Part 6.
2. Certifies that automatic daylighting controls meet-comply with the applicable requirements of Section 119 and Section 131(~~ed~~) 2D.
3. Certifies that when a multi-level astronomical time switch is used to meet EXCEPTION 3 to Section 131(c)2B all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets-complies with the applicable requirements of Section 119 and that has an override switch that meets the requirements of Section 131(~~d~~)(~~c~~)23.
4. Certifies that lighting controls meet the requirements of Section 131(a) through Section 131(c), Sections 131(e) and (f), and Section 146(a)2 as applicable.
5. Certifies that automatic lighting controls meet-comply with the applicable requirements of Section 119 and Section 131(~~d~~)(~~c~~).
6. Certifies that occupant-sensors meet-comply with the applicable requirements of Section 119 and Section 131(~~d~~)(~~c~~).
7. Certified that outdoor lighting controls meet-comply with the applicable requirements of Section 119 and Section 132.
8. Certifies that the lighting system tuning is set in accordance with the setting specified in (xxx TBD).
9. Certifies that lighting control systems installed to comply with Title 24, Part 6 meet the applicable requirements in Section 119.

# Daylighting – Sections 131(d) Mandatory Controls; 141 Prescriptive Daylighting Requirements; 143(c) Minimum Daylight Areas; 146 Prescriptive Daylight Requirements; 149 Alterations

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## SECTION 131 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

### ~~(c) Daylight Areas.~~

#### ~~1. Daylight areas shall be defined as follows:~~

~~A. DAYLIGHT AREA the total daylight area shall not double count overlapping areas with any primary sidelit daylight area, secondary sidelit daylight area, or skylit daylight area.~~

~~B. DAYLIGHT AREA, PRIMARY SIDELIT is the combined primary sidelit area without double counting overlapping areas. The floor area for each primary sidelit area is directly adjacent to vertical glazing below the ceiling with an area equal to the product of the sidelit width and the primary sidelit depth.~~

~~The primary sidelit width is the width of the window plus, on each side, the smallest of:~~

~~i. 2 feet; or~~

~~ii. The distance to any 5 feet or higher permanent vertical obstruction.~~

~~The primary sidelit depth is the horizontal distance perpendicular to the glazing which is the smaller of:~~

~~i. One window head height; or~~

~~ii. The distance to any 5 feet or higher permanent vertical obstruction.~~

~~C. DAYLIGHT AREA, SECONDARY SIDELIT is the combined secondary sidelit area without double counting overlapping areas. The floor area for each secondary sidelit area is directly adjacent to primary sidelit area with an area equal to the product of the sidelit width and the secondary sidelit depth.~~

~~The secondary sidelit width is the width of the window plus, on each side, the smallest of:~~

~~i. 2 feet; or~~

~~ii. The distance to any 5 feet or higher permanent vertical obstruction; or~~

~~iii. The distance to any skylit daylight area.~~

~~The secondary sidelit depth is the horizontal distance perpendicular to the glazing which begins from one window head height, and ends at the smaller of:~~

~~i. Two window head heights;~~

~~ii. The distance to any 5 feet or higher permanent vertical obstruction; or~~

~~iii. The distance to any skylit daylight area.~~

~~D. DAYLIGHT AREA, SKYLIT is the combined daylight area under each skylight without double counting overlapping areas. The daylight area under each skylight is bounded by the rough opening of the skylight, plus horizontally in each direction the smallest of:~~

~~i. 70 percent of the floor to ceiling height; or~~

~~ii. The distance to any primary sidelit area, or the daylight area under rooftop monitors; or~~

- iii. ~~The distance to any permanent partition or permanent rack which is farther away than 70 percent of the distance between the top of the permanent partition or permanent rack and the ceiling.~~
- 2. ~~Luminaires providing general lighting that are in or are partially in the skylit daylight area and/or the primary sidelit daylight area shall be controlled as follows:~~
  - A. ~~Primary sidelit and skylit daylight areas shall have at least one lighting control that:~~
    - i. ~~Controls at least 50 percent of the general lighting power in the primary sidelit and skylit daylight areas separately from other lighting in the enclosed space, in a uniform level of illuminance in accordance with Section 131(b).~~
    - ii. ~~Controls luminaires in primary sidelit areas separately from skylit areas.~~

**~~EXCEPTION to Section 131(c) 2A:~~** ~~Primary sidelit and skylit daylight areas that have a combined area totaling less than or equal to 250 square feet within any enclosed space.~~
  - B. ~~For all skylit daylight areas:~~
    - i. ~~The skylit daylight area shall be shown on the plans.~~
    - ii. ~~All of the general lighting in the skylit area shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119.~~
    - iii. ~~The automatic daylighting control shall be installed in accordance with Section 131(c)2D.~~

**~~EXCEPTION 1 to Section 131(c)2B:~~** ~~Where the total skylit daylight area in any enclosed space is less than or equal to 2,500 square feet.~~

**~~EXCEPTION 2 to Section 131(c)2B:~~** ~~Skylit daylight areas where existing adjacent structures obstruct direct beam sunlight for at least 6 hours per day during the equinox as calculated using computer or graphical methods.~~

**~~EXCEPTION 3 to Section 131(c)2B:~~** ~~When the skylight effective aperture is greater than 4.0 percent, and all general lighting in the skylit area is controlled by a multi-level astronomical time switch that meets the requirements of Section 119(h) and that has an override switch that meets the requirements of Section 131(d)2.~~

**~~EXCEPTION 4 to Section 131(c)2B:~~** ~~Skylit daylight areas where the effective aperture is less than 0.006. The effective aperture for skylit daylight areas is specified in Section 146(a)2E.~~
  - C. ~~The primary sidelit area(s) shall be shown on the plans, and the general lighting in the primary sidelit areas shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119 and is installed in accordance with Section 131(c) 2D.~~

**~~EXCEPTION 1 to Section 131(c) 2C:~~** ~~Where the total primary sidelit daylight area in any enclosed space has an area less than or equal to 2,500 square feet.~~

**~~EXCEPTION 2 to Section 131(c) 2C:~~** ~~Primary sidelit daylight areas where the effective aperture is less than 0.1. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E.~~

**~~EXCEPTION 3 to Section 131(c) 2C:~~** ~~Primary sidelit daylight areas where existing adjacent structures are twice as tall as their distance away from the windows.~~

**~~EXCEPTION 4 to Section 131(c) 2C:~~** ~~Parking garages.~~
  - D. ~~Automatic Daylighting Control Device Installation and Operation. Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:~~
    - i. ~~Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.~~
    - ii. ~~The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.~~

~~iii. Automatic daylighting controls shall be multi-level, including continuous dimming, and have at least one control step that is between 50 to 70 percent of rated power of the controlled lighting shall provide multi-level lighting in accordance with Section 131(b).~~

**EXCEPTION 1 to Section 131(c) 2Diii:** Controlled lighting having a lighting power density less than 0.3 W/ft<sup>2</sup>.

**EXCEPTION 2 to Section 131(c) 2Diii:** When skylights are replaced or added to on an existing building with an existing general lighting system.

~~iv. Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.~~

~~v. When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.~~

**(d) Automatic Daylighting Controls.**

**1. Daylit Zones shall be defined as follows:**

**A. SKYLIT DAYLIT ZONE** is the area on plan within a space, under each skylight, 0.7 times ceiling height in each direction from the edge of the rough opening of the skylight.

**B. PRIMARY SIDELIT DAYLIT ZONE** is the area on plan within a space, directly adjacent to each vertical glazing, one window head height deep into the space, and window width plus 0.5 times window head height wide on each side of the rough opening of the window.

**C. SECONDARY SIDELIT DAYLIT ZONE** is the area on plan within a space, directly adjacent to each vertical glazing, two window head heights deep into the space, and window width plus 0.5 times window head height wide on each side of the rough opening of the window.

**2. Luminaires providing general lighting that are in or partially in the skylit daylit zones and the primary sidelit daylit zones shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119, is installed in accordance with Section 131(d)2D, and meets the applicable requirements below:**

**EXCEPTION 1 to Section 131(d)2:** Rooms in which the total wattage of general lighting that is in, or partially in, a skylit daylit zone and primary sidelit daylight zone is less than 120 Watts

**EXCEPTION 2 to Section 131(d)2:** Rooms which have a total glazing area of less than 24 feet

**EXCEPTION 2 to Section 131(d)2:** Parking garages complying with Section 131(d)3.

**A. All skylit daylit zones and primary sidelit daylit zones shall be shown on plan.**

**B. Luminaires in the skylit daylit zone shall be controlled separately from those in the primary sidelit daylit zones**

**C. Luminaires that fall in a skylit and primary sidelit daylit zone shall be controlled as part of the skylit daylit zone**

**D. Automatic Daylighting Control Device Installation and Operation.** Automatic daylighting control devices shall be installed and configured to operate according to all of the following requirements:

**i. —A**Automatic daylighting control devices shall have photosensors that are located so that they are not readily accessible in accordance with the designer's or manufacturer's instructions.

**ii. —**The location where calibration adjustments are made to the automatic daylighting control device shall be readily accessible to authorized personnel, or located within 2 feet of a ceiling access panel that is no higher than 11 feet above floor level.

iii. Automatic daylighting controls shall be multi-level, including continuous dimming, and have at least the number of control steps specified in Table 131-A

**EXCEPTION 1 to Section 131(d)2Diii:** Controlled lighting having a lighting power density less than 0.3 W/ft<sup>2</sup>.

**EXCEPTION 2 to Section 131(d)2Diii:** When skylights are replaced or added to on an existing building into room or area where there is an existing general lighting system.iv. Under all daylight conditions in all areas served by the controlled lighting, the combined illuminance from the controlled lighting and daylight is not less than the illuminance from controlled lighting when no daylight is available.

v. When all areas served by the controlled lighting are receiving daylight illuminance levels greater than 150 percent of the illuminance from controlled lighting when no daylight is available, the controlled lighting power consumption shall be no greater than 35 percent of the rated power of the controlled lighting.

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## SECTION 141 – PERFORMANCE APPROACH: ENERGY BUDGETS.

In order to meet the energy budget, a proposed building's use of TDV energy calculated under Subsection (b) must be no greater than the TDV energy budget calculated under Subsection (a).

- (a) **Energy Budget.** The energy budget for a proposed building is the sum of the space-conditioning, lighting, and service water-heating budgets in Subdivisions 1, 2, and 3 of this subsection, expressed in Btu per square foot of conditioned floor area per year.
  2. **Lighting budget.** The lighting budget is the TDV energy used for lighting in a standard building calculated with a method approved by the Commission (expressed in Btu per square foot of conditioned floor area per year), and assuming that:
    - A. The lighting power density of the standard building, for areas where no lighting plans or specifications are submitted for permit and the occupancy of the building is known, is the maximum allowed lighting power density calculated according to Section 146(c)1; and
    - B. The lighting power density of the standard building, for areas where no lighting plans or specifications are submitted for permit, and the occupancy of the building is not known, is 1.2 watts per square foot; and
    - C. The lighting power density of the standard building, for areas where lighting plans and specifications are being submitted for permit, is the maximum allowed lighting power density calculated according to Section 146(c) 1, 2, or 3; and
    - D. The lighting power density of the standard building is adjusted as described in the Nonresidential ACM Manual ~~for an astronomical timeclock when required by Section 131(e)2~~ for the presence of automatic daylighting controls in the secondary sidelit zones as required by Section 146(d).
  3. **Service water-heating budget.** The service water-heating budget is the TDV energy used for service water heating in a standard building in the climate zone in which the proposed building is located, calculated with a method approved by the Commission (expressed in Btu per square foot of conditioned floor area per year), and assuming that the standard building has a service water-heating system that meets, but does not exceed, the applicable requirements of Sections 111, 113, 123, and 145.
- (b) **TDV Energy Use of Proposed Building.** The TDV energy use of a proposed building is the sum of the space-conditioning, lighting, and service water-heating TDV energy use calculated in Subdivisions 1, 2, and 3 of this subsection, using the same Compliance software used to calculate the budget under Subsection (a), and expressed in Btu per square foot of conditioned floor area per year. If any feature of the proposed building, including, but not limited to, the envelope or the space-conditioning, lighting, or service water-heating system, is not included in the building permit application, the energy performance of the feature shall be assumed to be that of the corresponding feature calculated in Subsection (a).
  2. **Lighting TDV energy use.** The lighting TDV energy use shall be calculated using a method approved by the Commission, and using the actual lighting power density calculated under Section 146(c), including reduction of

wattage by the applicable lighting power adjustment factors specified in Section 146(a)2. The lighting power density shall also be adjusted as described in the Nonresidential ACM Manual for ~~an astronomical timeclock when required by Section 131(e)2~~ the presence of automatic daylighting controls in the secondary sidelite zones as required by Section 146(d).

## 143 NR Prescriptive Envelope

c) **Minimum ~~Skylight Area Daylighting Requirement~~ for Large Enclosed Spaces in Buildings with Three or Fewer Stories.** In climate zones 2 through 15, low rise conditioned or unconditioned enclosed spaces that are greater than 8,000 ft<sup>2</sup> directly under a roof with ceiling heights greater than 15 feet shall meet ~~Sections 143(e)1-4 below~~ the following requirements.

- ~~1. **Daylit Area.** At least one half of the floor area shall be in the skylit daylight area, the primary sidelit daylight area, or a combination of the skylit and primary sidelit daylight areas. The skylit and primary sidelit daylight areas shall be shown on the building plans. Skylit and primary sidelit daylight areas are defined in Section 131(e)1.~~
- ~~2. **Minimum Skylight Area or Effective Aperture.** Areas that are skylit shall have a minimum skylight area to skylit area ratio of at least 3.3 percent or minimum skylight effective aperture of at least 1.1 percent. Skylight effective aperture shall be determined as specified in EQUATION 146-C. If primary sidelit area is used to comply with Section 143(e)1, the primary sidelit daylight areas shall have an effective aperture greater than 10 percent. The effective aperture for primary sidelit daylight areas is specified in Section 146(a)2E.~~
1. At least 75% of the floor area will be within a horizontal distance of one head height from windows or within 0.7 time average ceiling height from the edge of rough opening of skylights
2. All skylit daylit zones and the primary sidelit daylit zones shall be shown on plan
3. General lighting in daylit zones shall be controlled in accordance with Section 131(d).
- ~~36. **Skylight Characteristics.** Skylights shall:~~
  - A. Have a glazing material or diffuser that has a measured haze value greater than 90 percent, tested according to ASTM D1003 (notwithstanding its scope) or other test method approved by the Commission; and
  - B. If the space is conditioned, meet the requirements in Section 143(a)6 or 143(b).
- ~~4. **Controls.** Electric lighting in the daylit area shall be controlled as described in Section 131(e)2.~~

**EXCEPTION 1 to Section 143(c):** Auditoriums, churches, movie theaters, museums, and refrigerated warehouses.

**EXCEPTION 2 to Section 143(c):** In buildings with unfinished interiors, future enclosed spaces where it is planned to have less than or equal to 8,000 square feet of floor area, or ceiling heights less than or equal to 15 feet, based on proposed future interior wall and ceiling locations as delineated in the plans. This exception shall not apply to these future enclosed spaces when interior walls and ceilings are installed for the first time, the enclosed space floor area is greater than 8,000 square feet, and the ceiling height is greater than 15 feet (see Section 149(b)1M). This exception shall not be used for S-1 or S-2 (storage), or for F-1 or F-2 (factory) occupancies.

**EXCEPTION 3 to Section 143(c):** Enclosed spaces having a designed general lighting system with a lighting power density less than 0.5 watts per square foot.

# 146 NR Prescriptive Lighting

## SECTION 146 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

A building complies with this section if the actual lighting power density calculated under Subsection (a) is no greater than the allowed indoor lighting power calculated under Subsection (c), lighting power trade-offs comply with Subsection (b) and general lighting in secondary sidelit zones complies with the lighting controls requirements in Subsection (d).

~~E. For automatic daylighting control PAFs, the luminaire(s) shall be controlled by the automatic daylighting control(s) complying with applicable requirements of Section 119 and installed according to Section 131(c)2D. The PAF's are calculated based on PAFs described below in Section 146(a) 2E (i through iii), and at least 50 percent of the controlled luminaires shall be located within the daylight area. Daylight controls shall not control lamps that are outside of the daylight area (skylit, primary sidelit, and/or secondary sidelit daylight areas). The daylight area associated with the daylighting control receiving the PAF shall be shown on the building plans. PAFs shall not be available for automatic daylighting controls required by Section 131(c)2B and C.~~

### ~~i. Power Adjustment Factor for controlling Primary Sidelit Daylight Areas:~~

~~The PAF for the primary sidelit daylight area shall be used only if the daylighting control is separately controlling lighting within the primary sidelit daylight area. If lighting in the primary sidelit area is controlled together with lighting in the secondary sidelit area, the PAF for the secondary sidelit area in accordance with Section 146(a) 2Eii shall be used. The PAF is a function of the effective aperture of the primary sidelit daylight area in accordance with EQUATION 146 A.~~

### ~~EQUATION 146 A – EFFECTIVE APERTURE OF THE PRIMARY SIDELIT AREA~~

$$\text{Primary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times VT}{\text{Primary Sidelit Daylight Area}}$$

### ~~WHERE:~~

<del>Window Area</del>	<del>=</del>	<del>rough opening of windows adjacent to the sidelit area, ft<sup>2</sup></del>
<del>Window VT</del>	<del>=</del>	<del>visible light transmittance of window, no units</del>
<del>Primary Sidelit Daylight Area</del>	<del>=</del>	<del>see Section 131(c)1 daylight area, primary sidelit</del>

### ~~ii. Power Adjustment Factor for controlling secondary sidelit areas:~~

~~To qualify for the secondary sidelit daylight area PAF, the lighting in the secondary sidelit daylight area, or the lighting in the combined primary and secondary sidelit areas shall be controlled separately from lighting outside of these sidelit areas. The PAF is a function of the effective aperture of the secondary sidelit area in accordance with Equation 146 B.~~



~~EQUATION 146-B—EFFECTIVE APERTURE OF THE SECONDARY SIDELIT AREA~~

$$\text{Secondary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times VT}{\text{Secondary Sidelit Daylight Area} + \text{Primary Sidelit Daylight Area}}$$

~~WHERE:~~

<del>Window Area</del>	=	<del>rough opening of windows adjacent to the sidelit area, ft<sup>2</sup></del>
<del>Window VT</del>	=	<del>visible light transmittance of window, no units</del>
<del>Primary Sidelit Daylight Area</del>	=	<del>see Section 131(c)1 daylight area, primary sidelit</del>
<del>Secondary Sidelit Daylight Area</del>	=	<del>see Section 131(c)1C daylight area, secondary sidelit</del>

~~iii. Power Adjustment Factor for controlling skylit areas.~~

~~The PAF is a function of the lighting power density of the general lighting in the space and the effective aperture of the skylights shall be determined in accordance with Equation 146-C.~~

~~EQUATION 146-C—EFFECTIVE APERTURE OF SKYLIGHTS~~

$$\text{Skylit Effective Aperture} = \frac{0.85 \times \sum \text{Skylight Area} \times VT \times \text{Well Efficiency}}{\text{Skylit Daylight Area}}$$

~~WHERE:~~

<del>Skylight Area</del>	=	<del>the area of each individual skylight</del>
<del>Skylit Daylight Area</del>	=	<del>see Section 131(c)1D daylight area, skylit</del>
<del>VT</del>	=	<del>visible light transmittance. The VT shall include all skylighting system accessories including diffusers, louvers and other attachments that impact the diffusion of skylight into the space. The visible light transmittance of movable accessories shall be rated in the full open position. When the visible light transmittance of glazing and accessories are rated separately, the overall glazing transmittance is the product of the visible light transmittances of the glazings and accessories.</del>
<del>Well Efficiency</del>	=	<del>the ratio of the amount of visible light leaving a skylight well to the amount of visible light entering the skylight well. Well Efficiency shall be determined from Equation 146-F or Table 146-B for specular and tubular light wells and from Table 146-A for all other light wells, based on the weighted average reflectance of the walls of the well and the geometry of the light well, or other test method approved by the Commission. The well efficiency for non-specular or non-tubular light wells is based on the average weighted reflectance of the walls of the light well and the well cavity ratio. The well cavity ratio (WCR) is determined by the geometry of the skylight well and shall be determined using either Equation 146-D or Equation 146-E.</del>

~~EQUATION 146-D WELL CAVITY RATIO FOR RECTANGULAR WELLS~~

$$\text{WCR} = \left( \frac{5 \times \text{well height} (\text{well length} + \text{well width})}{\text{well length} \times \text{well width}} \right) \div 0.7$$

~~EQUATION 146-E WELL CAVITY RATIO FOR NON-RECTANGULAR SHAPED WELLS:~~

$$\text{WCR} = \left( \frac{2.5 \times \text{well height} \times \text{well perimeter}}{\text{well area}} \right)$$

Where the well perimeter and well area are measured at the bottom of the well.

~~EQUATION 146-F WELL EFFICIENCY FOR SPECULAR TUBULAR LIGHT WELLS:~~

$$WE_{Tube} = \rho \left( 2.2 * \frac{L}{D} \right)$$

WHERE:

$\rho$  = specular reflectance of interior light well wall  
 $L/D$  = ratio of light well length to light well interior diameter

~~F. — PAFs shall not be available for demand responsive lighting controls required by Section 131(g).~~

(d) Automatic Daylighting Controls in Secondary Daylit Zones. Luminaires providing general lighting that are in, or partially in, the secondary sidelit daylit zones, and not included in the primary sidelit daylit zones shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119, is installed in accordance with Section 131(d)2C, and shall meet the following requirements as applicable:

1. All secondary sidelit daylit zones shall be shown on plan.
2. Luminaires in the secondary sidelit daylit zones shall be controlled separately from those in the primary sidelit daylit zones and skylit daylit zones.
3. Luminaires that fall in a skylit and secondary sidelit daylit zone shall be controlled as part of the skylit daylit zone

EXCEPTION 1 to Section 146(d): Total wattage of general lighting that is in or partially in a secondary sidelit daylight zone(s) is less than 120 Watts

EXCEPTION 2 to Section 146(d): Parking garages complying with Section 131(d)3.

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## SECTION 149 – Daylighting Required for Alterations - To Be Determined

# Draft for April 4, 2011 Staff Workshop

## 146 NR Prescriptive Lighting

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### SECTION 146 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

A building complies with this section if the actual lighting power density calculated under Subsection (a) is no greater than the allowed indoor lighting power calculated under Subsection (c), lighting power trade-offs comply with Subsection (b) and general lighting in secondary sidelit zones complies with the lighting controls requirements in Subsection (d).

- (a) **Calculation of Actual Indoor Lighting Power Density.** The actual indoor lighting power of the proposed building area is the total watts of all planned permanent and portable lighting systems; subject to the following specific requirements and adjustments under Subsections 1 through 4.

**EXCEPTION to Section 146(a):** Up to ~~0.2~~ 0.3 watts per square foot of portable lighting for office areas shall not be required to be included in the calculation of actual indoor lighting power density.

1. **Multiple interlocked lighting systems serving a space.** When multiple interlocked lighting systems serve an auditorium, convention center, conference room, multipurpose room, or theater, the watts of all systems except the system with the highest wattage may be excluded if the lighting systems are interlocked with a non-programmable double throw switch to prevent simultaneous operation.
2. **Reduction of wattage through controls.** The controlled watts of any luminaire may be reduced by the number of controlled watts times the applicable TABLE 146-A Power Adjustment Factor (PAF) from TABLE 146-A ~~TABLE 146-C~~ if:
  - A. The control complies with the applicable requirements of Section 119; and
  - B. At least 50 percent of the light output of the luminaire is within the applicable space listed in TABLE 146-A ~~TABLE 146-C~~; and
  - C. Except as noted in TABLE 146-A ~~TABLE 146-C~~, only one PAF is used for the luminaire; and
  - D. Multi-level occupant sensors used to qualify for the PAF in any space less than or equal to 250 square feet enclosed by floor-to-ceiling partitions, or any size classroom, ~~corridor~~, conference or waiting room, shall meet the applicable requirements of Section 119. The multi-level occupancy sensor shall be installed to meet all the multi-level and uniformity requirements of Section 131(b) ~~for the controlled lighting~~. The first stage shall automatically activate between 30-70 percent of the lighting power in a room ~~either through an automatic or manual action~~, and may be a switching or dimming system. After that event occurs any of the following actions shall be assigned to occur when manually called to do so by the occupant:
    - i. Activating the alternate set of lights.
    - ii. Activating 100 percent of the lighting power.
    - iii. Deactivating all lights.
  - ~~E. For automatic daylighting control PAFs, the luminaire(s) shall be controlled by the automatic daylighting control(s) complying with applicable requirements of Section 119 and installed according to Section 131(c)2D. The PAF's are calculated based on PAFs described below in Section 146(a) 2E (i through iii), and at least 50 percent of the controlled luminaires shall be located within the daylight area. Daylight controls shall not control lamps that are outside of the daylight area (skylit, primary sidelit, and/or secondary sidelit daylight areas). The daylight area associated with the daylighting control receiving the PAF shall be shown~~

on the building plans. PAFs shall not be available for automatic daylighting controls required by Section 131(c)2B and C.

**i. ~~Power Adjustment Factor for controlling Primary Sidelit Daylight Areas:~~**

The PAF for the primary sidelit daylight area shall be used only if the daylighting control is separately controlling lighting within the primary sidelit daylight area. If lighting in the primary sidelit area is controlled together with lighting in the secondary sidelit area, the PAF for the secondary sidelit area in accordance with Section 146(a) 2Eii shall be used. The PAF is a function of the effective aperture of the primary sidelit daylight area in accordance with EQUATION 146 A.

~~EQUATION 146 A EFFECTIVE APERTURE OF THE PRIMARY SIDELIT AREA~~

$$\text{Primary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times VT}{\text{Primary Sidelit Daylight Area}}$$

WHERE:

<i>Window Area</i>	=	rough opening of windows adjacent to the sidelit area, ft <sup>2</sup>
<i>Window VT</i>	=	visible light transmittance of window, no units
<i>Primary Sidelit Daylight Area</i>	=	see Section 131(c)1 daylight area, primary sidelit

**ii. ~~Power Adjustment Factor for controlling secondary sidelit areas:~~**

To qualify for the secondary sidelit daylight area PAF, the lighting in the secondary sidelit daylight area, or the lighting in the combined primary and secondary sidelit areas shall be controlled separately from lighting outside of these sidelit areas. The PAF is a function of the effective aperture of the secondary sidelit area in accordance with Equation 146 B.

~~EQUATION 146 B EFFECTIVE APERTURE OF THE SECONDARY SIDELIT AREA~~

$$\text{Secondary Sidelit Effective Aperture} = \frac{\sum \text{Window Area} \times VT}{\text{Secondary Sidelit Daylight Area} + \text{Primary Sidelit Daylight Area}}$$

WHERE:

<i>Window Area</i>	=	rough opening of windows adjacent to the sidelit area, ft <sup>2</sup>
<i>Window VT</i>	=	visible light transmittance of window, no units
<i>Primary Sidelit Daylight Area</i>	=	see Section 131(c)1 daylight area, primary sidelit
<i>Secondary Sidelit Daylight Area</i>	=	see Section 131(c)1C daylight area, secondary sidelit

**iii. ~~Power Adjustment Factor for controlling skylit areas:~~**

The PAF is a function of the lighting power density of the general lighting in the space and the effective aperture of the skylights shall be determined in accordance with Equation 146 C.

~~EQUATION 146-C EFFECTIVE APERTURE OF SKYLIGHTS~~

$$\text{Skylit Effective Aperture} = \frac{0.85 \times \sum \text{Skylight Area} \times \text{VT} \times \text{Well Efficiency}}{\text{Skylit Daylight Area}}$$

~~WHERE:~~

<del>Skylight Area</del>	=	<del>the area of each individual skylight</del>
<del>Skylit Daylight Area</del>	=	<del>see Section 131(c)1D daylight area, skylit</del>
<del>VT</del>	=	<del>visible light transmittance. The VT shall include all skylighting system accessories including diffusers, louvers and other attachments that impact the diffusion of skylight into the space. The visible light transmittance of movable accessories shall be rated in the full open position. When the visible light transmittance of glazing and accessories are rated separately, the overall glazing transmittance is the product of the visible light transmittances of the glazings and accessories.</del>
<del>Well Efficiency</del>	=	<del>the ratio of the amount of visible light leaving a skylight well to the amount of visible light entering the skylight well. Well Efficiency shall be determined from Equation 146-F or Table 146-B for specular and tubular light wells and from Table 146-A for all other light wells, based on the weighted average reflectance of the walls of the well and the geometry of the light well, or other test method approved by the Commission. The well efficiency for non-specular or non-tubular light wells is based on the average weighted reflectance of the walls of the light well and the well cavity ratio. The well cavity ratio (WCR) is determined by the geometry of the skylight well and shall be determined using either Equation 146-D or Equation 146-E.</del>

~~EQUATION 146-D WELL CAVITY RATIO FOR RECTANGULAR WELLS~~

$$\text{WCR} = \left( \frac{5 \times \text{well height} (\text{well length} + \text{well width})}{\text{well length} \times \text{well width}} \right); \text{ or}$$

~~EQUATION 146-E WELL CAVITY RATIO FOR NON-RECTANGULAR-SHAPED WELLS:~~

$$\text{WCR} = \left( \frac{2.5 \times \text{well height} \times \text{well perimeter}}{\text{well area}} \right)$$

~~Where the well perimeter and well area are measured at the bottom of the well.~~

~~EQUATION 146-F WELL EFFICIENCY FOR SPECULAR TUBULAR LIGHT WELLS:~~

$$\text{WE}_{\text{Tube}} = \rho^{\left( 2.2 * \frac{L}{D} \right)}$$

~~WHERE:~~

<del><math>\rho</math></del>	=	<del>specular reflectance of interior light well wall</del>
<del><math>L/D</math></del>	=	<del>ratio of light well length to light well interior diameter</del>

~~F. PAFs shall not be available for demand responsive lighting controls required by Section 131(g).~~

3. **Lighting wattage excluded.** The watts of the following lighting applications may be excluded from Section 146(c):
- A. In theme parks: Lighting for themes and special effects.
  - B. Studio lighting for film or photography provided that these lighting systems are separately switched from a general lighting system.
  - C. Lighting for dance floors, lighting for theatrical and other live performances, and theatrical lighting used for religious worship, provided that these lighting systems are additions to a general lighting system and are separately controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
  - D. In civic facilities, transportation facilities, convention centers, and hotel function areas: Lighting for temporary exhibits, if the lighting is an addition to a general lighting system and is separately controlled from a panel accessible only to authorized operators.
  - E. Lighting installed by the manufacturer in ~~refrigerated cases~~, walk-in freezers, vending machines, food preparation equipment, and scientific and industrial equipment.
  - F. In medical and clinical buildings: Examination and surgical lights, low-ambient night-lights, and lighting integral to medical equipment, provided that these lighting systems are additions to and separately switched from a general lighting system.
  - G. Lighting for plant growth or maintenance, if it is controlled by a multi-level astronomical time-switch control that complies with the applicable provisions of Section 119.
  - H. Lighting equipment that is for sale.
  - I. Lighting demonstration equipment in lighting education facilities.
  - J. Lighting that is required for exit signs subject to the CBC. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.
  - K. Exitway or egress illumination that is normally off and that is subject to the CBC.
  - L. In hotel/motel buildings: Lighting in guestrooms (lighting in hotel/motel guestrooms shall comply with Section 130(b)).
  - M. In high-rise residential buildings: Lighting in dwelling units (Lighting in high-rise residential dwelling units shall comply with Section 130(b)).
  - N. Temporary lighting systems.
  - O. Lighting in occupancy group U buildings less than 1000 square feet.
  - P. Lighting in unconditioned agricultural buildings less than 2500 square feet.
  - Q. Lighting systems in qualified historic buildings, as defined in the State Historic Building Code (Title 24, Part 8), are exempt from the lighting power allowances, if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems in qualified buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other lighting systems in qualified historic buildings shall comply with the lighting power allowances.
  - R. Lighting in parking garages for seven or less vehicles: Lighting in parking garages for seven or less vehicles shall comply with the applicable provisions of Section 150(k).
  - S. Lighting for signs: Signs shall comply with Section 148.
  - T. Lighting in a videoconferencing studio: Up to 2.51.5 watts per square foot of lighting in a videoconferencing studio, provided the videoconferencing lighting is in addition to and separately switched from a general lighting system, all of the lighting is controlled by a multiscene programmable control system, ~~and~~ the video conferencing studio has permanently installed videoconferencing cameras, audio equipment, and playback

equipment; and the lighting in the videoconferencing studio is certified as meeting the Acceptance Requirements for Code Compliance in accordance with Section 134.

U. Lighting for automatic teller machines that are located inside parking garages.

V. —Lighting in refrigerated cases less than 3,000 square feet. (Refrigerated cases less than 3,000 square feet shall comply with the Title 20 Appliance Efficiency Regulations.)

4. **Luminaire Power.** Luminaire power shall be determined in accordance with Section 130(~~de~~) and (~~ef~~) or by a method approved by the Commission.

**-(b) Indoor Lighting Power Trade-offs.** Indoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to the Complete Building Method may be traded only within a single building. Allowed lighting power shall not be traded between two or more buildings using the Complete Building Method. Conditioned and unconditioned spaces shall be separate allotments, which shall be met separately without trade-offs between the separate allotments.
2. Allowed lighting power determined according to the Area Category Method may be traded between the primary function areas using the Area Category Method. Conditioned and unconditioned spaces shall be separate allotments, which shall be met separately without trade-offs between the separate allotments.

**EXCEPTION to Section 146(b)2:** Additional lighting power allowed according to ~~TABLE 146-F~~ TABLE 146-D footnotes shall not be traded.

3. Allowed lighting power for wall display, floor display and ornamental/special effects lighting determined according to the Tailored Method shall be separate allotments without trade-offs between the separate allotments. Allowed lighting power for general illumination determined according to the Tailored Method may be traded only within the primary function areas using the Tailored Method.
4. Allowed lighting power shall not be traded between the Complete Building Method, Area Category Method or Tailored Method.

**EXCEPTION to Section 146(b)4:** Allowed lighting power may be traded from primary function areas using the Area Category Method to primary function areas using the Tailored Method.

5. Trading off lighting power allowances between indoor and outdoor areas shall not be permitted.

**(c) Calculation of Allowed Indoor Lighting Power Density.** The allowed indoor lighting power density for each building type of use, or each primary function area shall be calculated using one and only one of the methods in Subsection 1, 2 or 3 as applicable.

1. **Complete Building Method.** The Complete Building Method shall be used only on projects involving entire buildings with one type of use occupancy, mixed occupancy buildings where one type of use occupancy makes up 90 percent of the entire building, or a tenant space where one type of use makes up 90 percent of the space. This approach shall only be used when the applicant is applying for a lighting permit and submits plans and specifications for the entire building or the entire tenant space. Under this approach, the allowed lighting power density is the lighting power density value in ~~TABLE 146-C~~ TABLE 146-D times the floor area of the entire building. Retail and wholesale stores, hotel/motel, and high-rise residential buildings shall not use this method.

**EXCEPTION to Section 146(c) 1:** When using the Complete Building Method, if a parking garage and another Type of Use are part of a single building, the parking garage portion of the building and the remaining portion of the building shall each separately use the Complete Building Method of use categories from ~~TABLE 146-C~~ TABLE 146-D.

2. **Area Category Method.** When using the Area Category Method:

A. Under the Area Category Method, ~~the~~ The total allowed lighting power for the building is the sum of all allowed lighting powers for all areas in the building. For purposes of the Area Category Method, an "area" shall be defined as all contiguous spaces which accommodate or are associated with a single one of the primary functions listed in ~~TABLE 146-D~~ TABLE 146-F. Where areas are bounded or separated by interior partitions, the floor space occupied by those interior partitions shall be included in any area. If at the time of permitting a tenant is not identified for a multi-tenant space, the tenant leased space allowance from

~~TABLE 146-D~~~~TABLE TABLE 146-F~~ shall be used. When the Area Category Method is used to calculate the allowed total lighting power for an entire building, main entry lobbies, corridors, restrooms, and support functions shall be treated as separate areas.

~~B.—Additional lighting power is available for specialized task work, ornamental, precision, accent, display, decorative, and white boards and chalk boards, in accordance with the footnotes in TABLE 146-D~~~~Table 146-D~~. Only those primary function areas listed in this table, and having a footnote next to the allowed lighting power number in ~~TABLE 146-D~~~~Table 146-D~~ are allowed the added lighting power in accordance with the correlated footnotes listed at the bottom of the table. This added lighting power shall be used only if the plans clearly identify all task spaces and the lighting equipment designed to illuminate these tasks. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for these allowances. This added lighting power shall not be used when using the Complete Building Method, or the Tailored Lighting Method of compliance. The smallest of the added lighting power listed in each footnote, or the actual design wattage, may be added to the allowed lighting power.

3. **Tailored Method.** The Tailored Method shall be used only on projects with primary function areas that do not use the Area Category Method.

Under the Tailored Method, the allowed indoor lighting power shall be ~~calculated according to primary function type as permitted in column 1 of TABLE 146-G~~ determined as follows:-

- A. ~~Determine allowed general lighting power according to TABLE 146-E~~~~Table 146-E~~For all spaces, determine the general lighting allowance according to Section 146(e)3A.
- i. ~~If a~~The specific IESNA Illuminance Category ~~is~~ listed in Column 2 of ~~TABLE 146-E~~~~TABLE TABLE 146-G~~, then such illuminance Category shall be used to determine the Allowed General Lighting Power for the space. Otherwise, determine the illuminance category for each lighting primary function type according to categories specified in the IESNA Lighting Handbook (IESNA HB), using the “Design Guide” for illuminance. Tasks that are performed less than 2 hours a day or poor quality tasks that can be improved shall not be employed to justify use of Illuminance Categories E, F, or G.
  - ii. Determine the area of each primary function.
  - iii. Determine the room cavity ratio (RCR) for each primary function area. The RCR shall be calculated using either EQUATION 146-G or EQUATION 146-H.

*EQUATION 146-G ROOM CAVITY RATIO FOR RECTANGULAR ROOMS*

$$RCR = \frac{5 \times H \times (L + W)}{L \times W}$$

*EQUATION 146-H ROOM CAVITY RATIO FOR IRREGULAR-SHAPED ROOMS*

$$RCR = \frac{2.5 \times H \times P}{A}$$

WHERE:

- $L$  = Length of room.
- $W$  = Width of room.
- $H$  = Vertical distance from the work plane to the centerline of the lighting fixture.
- $P$  = Perimeter of room.
- $A$  = Area of room.



- iv. Multiply the area of each primary function by the allowed lighting power density for the illuminance category and RCR for each primary function area according to ~~TABLE 146-G~~~~TABLE TABLE 146-I~~. The product or the actual installed lighting power for the primary function, whichever is less, is the Allowed General Lighting Power for the space.
- B. Determine additional allowed power for display and decorative lighting ~~according to Sections 146(e)3B~~. Displays that are installed against a wall shall not qualify for the floor display lighting power allowances. Floor displays shall not qualify for the wall display allowances.
- i. Separate wall display lighting power is permitted if allowed by column 3 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~. The allowed wall display lighting power is the smaller of:
    - a. The product of the room wall lengths and the listed allowed power density watts per linear foot (W/lf) in column 3 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~ if applicable, or
    - b. ~~The~~ actual power of wall lighting systems.

The length of display walls shall include the length of the perimeter walls, including closable openings and permanent full height interior partitions. Permanent full height partitions are those which extend from the floor to within 2 feet of the ceiling or are taller than 10 feet, and are permanently anchored to the floor. Commercial and industrial storage stacks are not permanent full height partitions. For wall display lighting ~~mounting height where the bottom of the luminaire is of 11 feet 6 inches~~ 12 feet or higher above the finished floor ~~or higher~~, this amount may be increased by multiplying the product by the appropriate factor from ~~TABLE 146-F~~~~TABLE TABLE 146-H~~. Qualifying wall lighting systems shall be mounted within 10 feet of the wall and shall be of a lighting system type appropriate for wall lighting including a lighting track, wallwasher, valance, cove, or accent light including adjustable or fixed luminaires with PAR, R, MR, AR, or other projector lamp types.
  - ii. Separate floor display lighting power is allowed if allowed by column 4 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~. The allowed floor display lighting power is the smaller of:
    - a. The product of the area of the primary function and the allowed floor display lighting power density listed in column 4 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~, if applicable, or
    - b. The actual power of floor display lighting systems.

For floor display lighting where the bottom of the luminaires is 12 feet or higher ~~mounting of 11 feet 6 inches~~ above finished floor or higher, this amount may be increased by multiplying the product by the appropriate factor from ~~Error! Reference source not found. TABLE 146-F~~~~TABLE TABLE 146-H~~. Qualifying floor display lighting systems shall be mounted no closer than 2 feet to a wall and shall be a lighting system type such as track lighting, adjustable or fixed luminaires with PAR, R, MR, AR, or other projector lamp types or employing optics providing directional display light from non-directional lamps. Except for lighting that is external to display cases as defined below, lighting mounted inside of display cases shall also be considered floor display lighting.
  - iii. Separate ornamental/special effects lighting power is permitted if allowed by column 5 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~. If so, the allowed ornamental/special effects lighting power is the smaller of:
    - a. The product of the area of the primary function and the allowed ornamental/special effects lighting power density specified in column 5 of ~~TABLE TABLE 146-G~~~~TABLE 146-E~~, if applicable, or
    - b. The actual power of allowed ornamental/special effects lighting luminaires.

Qualifying ornamental luminaires include chandeliers, sconces, lanterns, neon and cold cathode, light emitting diodes, theatrical projectors, moving lights, and light color panels when used in a decorative manner that does not serve as display lighting. Ornamental/special effects lighting shall not be the only light source in the space.
  - iv. In retail merchandise sales, museum, and religious worship, the smallest of the following separate lighting power for display cases presenting very valuable display items is permitted:
    - a. The product of the area of the primary function and 1.0 watt per square foot; or

- b. The product of the area of the display case and 16 watts per square foot, or
- c. The actual power of lighting for very valuable displays.

Qualifying lighting includes internal display case lighting or external lighting employing highly directional luminaires specifically designed to illuminate the case or inspection area without spill light. To qualify for this allowance, cases shall contain jewelry, coins, fine china or crystal, precious stones, silver, small art objects and artifacts, and/or valuable collections the display of which involves customer inspection of very fine detail from outside of a locked case.

- v. Only the general portion of the lighting power determined in Section 146(c)3A above shall be used for tradeoffs among the various occupancy or task types of the permitted space. The allowed wall display lighting power, the allowed floor display lighting power, the allowed ornamental/special effect lighting power, and the allowed lighting power for very valuable displays are “use it or lose it” power allowances that shall not be traded off.

C. Determine allowed general lighting power using IESNA criteria.

- i. This method shall be used only for primary function areas listed in Section 146(c)3C(vi), shall use the Tailored Method only to determine general lighting power allowances, and shall not use any additional lighting power for display and decorative lighting available in Section 146(c)3B.
- ii. Determine the illuminance category for each lighting primary function type according to categories specified in the IESNA Lighting Handbook (IESNA HB), using the “Design Guide” for illuminance. Tasks that are performed less than 2 hours a day or poor quality tasks that can be improved shall not be employed to justify use of Illuminance Categories E, F, or G.
- iii Determine the area of each primary function
- iv. Determine the room cavity ratio (RCR) for each primary function area. The RCR shall be calculated using either EQUATION 146-G ~~EQUATION 146-G~~ or EQUATION 146-H ~~EQUATION 146-H~~.
- v. Multiply the area of each primary function by the allowed lighting power density for the illuminance category and RCR for each primary function area according to TABLE 146-G ~~TABLE 146-G~~. The product or the actual installed lighting power for the primary function, whichever is less, is the Allowed General Lighting Power for the space.
- vi Primary Function areas eligible to use this method include only the following:
  - a. Exercise center, Gymnasium
  - b. Medical and clinical care
  - c. Police or Fire Stations
  - d. Public rest areas along state and federal roadways
  - e. All other not listed in TABLE 146-D ~~Tables 146-D~~ or TABLE 146-E ~~146-E~~

(d) Automatic Daylighting Controls in Secondary Daylit Zones. Luminaires providing general lighting that are in, or partially in, the secondary sidelit daylit zones, and not included in the primary sidelit daylit zones shall be controlled independently by an automatic daylighting control device that meets the applicable requirements of Section 119, is installed in accordance with Section 131(d)2C, and shall meet the following requirements as applicable:

1. All secondary sidelit daylit zones shall be shown on plan.
2. Luminaires in the secondary sidelit daylit zones shall be controlled separately from those in the primary sidelit daylit zones and skylit daylit zones.
3. Luminaires that fall in a skylit and secondary sidelit daylit zone shall be controlled as part of the skylit daylit zone

**EXCEPTION 1 to Section 146(d):** Total wattage of general lighting that is in or partially in a secondary sidelit daylight zone(s) is less than 120 Watts

**EXCEPTION 2 to Section 146(d):** Parking garages complying with Section 131(d)3.

***TABLE 146-A WELL EFFICIENCY FOR NON-SPECULAR OR NON-TUBULAR LIGHT WELLS***

	light well wall reflectance					
WCR	$\rho = 99\%$	$\rho = 90\%$	$\rho = 80\%$	$\rho = 70\%$	$\rho = 60\%$	$\rho = 40\%$
0	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	0.98	0.96	0.94	0.92	0.89
2	0.99	0.95	0.91	0.88	0.84	0.78
4	0.99	0.90	0.82	0.76	0.70	0.64
6	0.98	0.85	0.74	0.65	0.58	0.48
8	0.97	0.79	0.66	0.56	0.49	0.38
10	0.96	0.74	0.59	0.49	0.41	0.34
12	0.95	0.70	0.53	0.43	0.35	0.26
14	0.95	0.66	0.48	0.38	0.31	0.22
16	0.94	0.62	0.44	0.34	0.27	0.18
18	0.93	0.59	0.41	0.31	0.24	0.16
20	0.92	0.56	0.38	0.28	0.21	0.14

***TABLE 146-B WELL EFFICIENCY FOR SPECULAR TUBULAR LIGHT WELLS***

	Light Well Reflectance ( $\rho$ )						
L/D	$\rho = 99\%$	$\rho = 97\%$	$\rho = 95\%$	$\rho = 92\%$	$\rho = 90\%$	$\rho = 85\%$	$\rho = 80\%$
0.5	0.99	0.97	0.95	0.91	0.89	0.84	0.78
1.0	0.98	0.94	0.89	0.83	0.79	0.70	0.61
1.5	0.97	0.90	0.84	0.76	0.71	0.58	0.48
2.0	0.96	0.87	0.80	0.69	0.63	0.49	0.37
2.5	0.95	0.85	0.75	0.63	0.56	0.41	0.29
3.0	0.94	0.82	0.71	0.58	0.50	0.34	0.23
3.5	0.93	0.79	0.67	0.53	0.44	0.29	0.18
4.0	0.92	0.76	0.64	0.48	0.39	0.24	0.14
4.5	0.91	0.74	0.60	0.44	0.35	0.20	0.11
5.0	0.90	0.71	0.57	0.40	0.31	0.17	0.09
5.5	0.88	0.68	0.52	0.35	0.26	0.13	0.06
6.0	0.87	0.65	0.48	0.30	0.22	0.10	0.04

**TABLE 146-C146-A LIGHTING POWER ADJUSTMENT FACTORS**

TYPE OF CONTROL		TYPE OF SPACE			FACTOR	
Multi-level occupant sensor (see Note 2) combined with multi-level circuitry and switching in accordance with Section 146(a)2D		Any space ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, corridor, conference or waiting room.			0.20	
<del>Multi-level occupant sensor (see Note 2) that reduces lighting power at least 50% when no persons are present. May be a switching or dimming (see Note 3) system.</del>		<del>Hallways of hotels/motels, multi-family, dormitory, and senior housing</del>			<del>0.25</del>	
		<del>Commercial and Industrial Storage stack areas (max. 2 aisles per sensor)</del>			<del>0.15</del>	
		<del>Library Stacks (maximum 2 aisles per sensor)</del>			<del>0.15</del>	
<u>Occupant Sensors</u>	<u>In open plan offices greater than 250 square feet. Which shall include only workstations</u>	<u>Shielded or tuned for coverage area</u>	<u>no larger than 125 square feet</u>	<u>0.4</u>		
			<u>of 126 to 250 square feet</u>	<u>0.3</u>		
			<u>of 251 to 500 square feet</u>	<u>0.2</u>		
Dimming system	Manual	Hotels/motels, restaurants, auditoriums, theaters			0.10	
	Multiscene programmable	Hotels/motels, restaurants, auditoriums, theaters			0.20	
Demand responsive lighting control that reduces lighting power consumption in response to a demand response signal. (See Note 1)		All building types less than 10,000 square feet			0.05	
Manual dimming of dimmable electronic ballasts. (see Note 3)		All building types			0.10	
Demand responsive lighting control that reduces lighting power consumption in response to a demand response signal when used in combination with manual dimming of dimmable electronic ballasts (see Note 1 and 3).		All building types less than 10,000 square feet			0.15	
Combined Controls	Multi-level occupant sensor (see Note 2) combined with multi-level circuitry and switching in accordance with Section 146(a)2D combined with automatic multi-level daylighting controls	Any space ≤ 250 square feet within a daylit area and enclosed by floor-to-ceiling partitions, any size classroom, corridor, conference or waiting room. The PAF may be added to the daylighting control credit			0.10	
	Manual dimming of dimmable electronic ballasts (see Note 3) when used in combination with a multi-level occupant sensor (see Note 2) combined with multi-level circuitry and switching in accordance with Section 146(a)2D.	Any space ≤ 250 square feet enclosed by floor-to-ceiling partitions; any size classroom, corridor, conference or waiting room			0.25	
Automatic multi-level daylighting controls (See Note 4)	Total primary sidelit daylight areas less than 2,500 ft² in an enclosed space and all secondary sidelit areas. (see Note 4)		Effective Aperture			
		General Lighting Power Density (W/ft²)	>10% and ≤20%	>20% and ≤35%	>35% and ≤65%	>65%
		All	0.12	0.20	0.25	0.30
	Total skylit daylight areas in an enclosed space less than 2,500 square feet, and where glazing material or diffuser has ASTM D1003 haze measurement greater than 90%		Effective Aperture			
		General Lighting Power Density (W/ft²)	0.6% ≤ EA < 1%	1% ≤ EA < 1.4%	1.4% ≤ EA < 1.8%	1.8% ≤ EA
		LPD < 0.7	0.24	0.30	0.32	0.34
		0.7 ≤ LPD < 1.0	0.18	0.26	0.30	0.32
		1.0 ≤ LPD < 1.4	0.12	0.22	0.26	0.28
		1.4 ≤ LPD	0.08	0.20	0.24	0.28

NOTES FOR TABLE ~~146-G~~146-A:

1. PAFs shall not be available for lighting controls required by Title 24, Part 6.
2. To qualify for the PAF the multi-level occupant sensor shall comply with the applicable requirements of Section 119.
3. To qualify for the PAF all dimming ballasts for T5 and T8 linear fluorescent lamps shall be electronic and shall be certified to the Commission with a minimum RSE in accordance with Table 146-B.146-B.

4- If the primary sidelit daylight area and the secondary sidelit daylight area are controlled together, the PAF is determined based on the secondary sidelit effective aperture for both the primary sidelit daylight area and the secondary sidelit daylight area.

**TABLE ~~146-D~~146-B. RELATIVE SYSTEM EFFICIENCY (RSE) FOR DIMMABLE ELECTRONIC BALLASTS USED TO QUALIFY FOR POWER ADJUSTMENT FACTOR**

RSE is required only for dimmable electronic ballasts for T5 and T8 fluorescent lighting systems used to qualify for a PAF according to Note 2 for ~~TABLE 146-A~~~~TABLE TABLE 146-C~~.

Lamp Category	1 or 2 Lamps			1 x 28W Lamp	2 x 28W Lamps	1 x 54W HO Lamps	2 x 54W HO Lamps
T5	0.85			3.03	1.51	1.57	0.78
	Required Relative System Efficiency (RSE)			Corresponding Ballast Efficacy Factor (BEF) 1			
Lamp Category	1 Lamp	2 or 3 Lamps	4 Lamps	1 x 32W Lamps	2 x 32W Lamps	3 x 32W Lamps	4 x 32W Lamps
T8	0.86	0.90	0.98	2.69	1.4	0.93	0.76
<p>1 To calculate corresponding BEFs for lamp wattages and number of lamps not shown, use the following formula:</p> $BEF = \left( \frac{RSE \times 100}{\# \text{ lamps} \times \text{lamp watts}} \right)$							
$RSE = \left( \frac{\text{Ballast Factor}}{\text{Ballast Input Power} / \text{Total Rated Lamp Power}} \right)$							
<p>NOTE: Total Rated Lamp Power = number of Lamps per Ballast x Rated Lamp Power.</p>							

**TABLE ~~146-E~~146-C COMPLETE BUILDING METHOD LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

TYPE OF USE	ALLOWED LIGHTING POWER
Auditoriums	1.5
Classroom Building	1.1
Commercial and industrial storage buildings	0.6
Convention centers	1.2
Financial institutions	1.1
General commercial and industrial work buildings	
High bay	1.0
Low bay	1.0
Grocery Stores	1.5
Library	1.3
Medical buildings and clinics	1.1
Office buildings	<del>0.85</del> <u>0.8</u>
Parking Garages	<del>0.3</del> <u>0.2</u>
Religious facilities	1.6
Restaurants	1.2
Schools	1.0
Theaters	1.3
All others	0.6

**TABLE ~~146-F~~146-D AREA CATEGORY METHOD - LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

PRIMARY FUNCTION		ALLOWED LIGHTING POWER (W/ft²)	PRIMARY FUNCTION		ALLOWED LIGHTING POWER (W/ft²)
Auditorium		1.5 <sup>+4</sup> <sub>4</sub>	Laboratory, Scientific		1.4 <sup>+4</sup> <sub>1</sub>
Auto Repair		0.9 <sup>2</sup>	Laundry		0.9
Beauty Salon		1.7	Library	Reading areas	1.2 <sup>3</sup>
Civic Meeting Place		1.3 <sup>+4</sup> <sub>4</sub>		Stacks	1.5 <sup>3</sup>
Classrooms, lecture, training, vocational room		1.2 <sup>6</sup>	Lobbies	Hotel lobby	1.1 <sup>1</sup>
Commercial and industrial storage (conditioned and unconditioned)		0.6		Main entry lobby	1.5 <sup>1</sup>
Commercial and industrial storage (refrigerated)		0.7	Locker/dressing room		0.8
Convention, conference, multipurpose and meeting centers		1.4 <sup>+4</sup> <sub>4</sub>	Lounge/recreation		1.1
Corridors, restrooms, stairs, and support areas		0.6	Malls and atria		1.2 <sup>+4</sup> <sub>4</sub>
Dining		1.1 <sup>+4</sup> <sub>4</sub>	Medical and clinical care		1.2
Electrical, mechanical, telephone rooms		0.7 <sup>2</sup>	Offices	> 250 square feet	0.9 <sup>0.75</sup>
Exercise center, gymnasium		1.0		≤ 250 square feet	1.1 <sup>1.0</sup>
Exhibit, museum		2.0	Parking Garage	Parking Area	0.2 <sup>0.14</sup>
Financial transactions		1.2 <sup>+4</sup> <sub>4</sub>		Dedicated Ramps	0.3
				Ramps and EntriesDaylight Adaptation Zones	0.6
General commercial and industrial work	Low bay	0.9 <sup>2</sup>	Religious Worship		1.5 <sup>+4</sup> <sub>4</sub>
	High bay	1.0 <sup>2</sup>	Retail merchandise sales, wholesale showrooms		1.6 <sup>1.2</sup> <sup>7 and 8</sup>
	Precision	1.2 <sup>3.5</sup>	Tenant lease space		1.0
Grocery Sales		1.6 <sup>1.2</sup> <sup>7 and 8</sup>	Theaters	Motion picture	0.9 <sup>+4</sup> <sub>4</sub>
Hotel function area		1.5 <sup>+4</sup> <sub>4</sub>		Performance	1.4 <sup>+4</sup> <sub>4</sub>
Housing, Public, and Commons Areas	Multi-family, Dormitory	1.0	Transportation Function		1.2
	Senior HousingSleeping Area	1.5	Waiting area		1.1 <sup>+4</sup> <sub>4</sub>
Kitchen, food preparation		1.6	All other		0.6
FOOTNOTES:					
<u>See Section 146(c)2 for an explanation of additional lighting power available for specialized task work, ornamental, precision, accent, display, decorative, and white boards and chalk boards, in accordance with the footnotes in this table. The smallest of the added lighting power listed in each footnote below, or the actual design wattage, may be added to the allowed lighting power only when using the Area Category Method of compliance.</u>					
<del>1. The smallest of the following values may be added to the allowed lighting power for ornamental chandeliers and sconces that are in addition to and switched or dimmed on circuits different from the circuits for general lighting:</del> <del>_____ a. One watt per square foot times the area of the task space that the chandelier or sconce is in; or</del> <del>_____ b. The actual design wattage of the chandelier or sconce.</del>					
<del>2. The smallest of the following values may be added to the allowed lighting power for specialized task work:</del> <del>_____ a. 0.5 watt per square foot times the area of the task space required for an art, craft assembly or manufacturing operation; or</del> <del>_____ b. The actual design wattage of the luminaire(s) providing illuminance to the specialized task area.</del> <del>For spaces employing this allowance, the plans shall clearly identify all task spaces using these tasks and the lighting equipment designed to illuminate these tasks. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for this specialized task work allowance.</del>					

3. The smallest of the following values may be added to the allowed power for precision commercial and industrial work:

- \_\_\_\_\_ a. One watt per square foot times the area of the task space required for the precision work; or
- \_\_\_\_\_ b. The actual design wattage of the luminaire(s) providing the illuminance to the precision task area.

For spaces employing this allowance, the plans shall clearly identify all task spaces using these tasks and the lighting equipment designed to illuminate these tasks. Tasks that are performed less than two hours per day or poor quality tasks that can be improved are not eligible for this precision task work allowance.

4. The smallest of the following values may be added to the allowed lighting power for specialized task work:

- \_\_\_\_\_ a. 0.2 watt per square foot times the area of the task space required for a lab in a school; or
- \_\_\_\_\_ b. The actual design wattage of the luminaire(s) providing illuminance to the specialized task area.

<u>Footnote number</u>	<u>Type of lighting system allowed</u>	<u>Maximum allowed added lighting power. Watts per square foot area of task space unless otherwise noted.</u>
<u>1</u>	<u>Specialized task work</u>	<u>0.2 W/ft<sup>2</sup></u>
<u>2</u>	<u>Specialized task work</u>	<u>0.5 W/ft<sup>2</sup></u>
<u>3</u>	<u>Ornamental or special effects lighting</u>	<u>0.5 W/ft<sup>2</sup></u>
<u>4</u>	<u>Ornamental chandeliers and sconces</u>	<u>0.7 W/ft<sup>2</sup></u>
<u>5</u>	<u>Precision commercial and industrial work</u>	<u>1.0 W/ft<sup>2</sup></u>
<u>6</u>	<u>Per linear foot of white board or chalk board.</u>	<u>5.5 W per linear foot</u>
<u>7</u>	<u>Accent, display and feature lighting - luminaires shall be adjustable or directional</u>	<u>0.3 W/ft<sup>2</sup></u>
<u>8</u>	<u>Decorative lighting - primary function shall be decorative and shall be in addition to general illumination.</u>	<u>0.2 W/ft<sup>2</sup></u>



**TABLE ~~146-G~~146-E TAILORED METHOD SPECIAL LIGHTING POWER ALLOWANCES**

1	2	3	4	5
Primary Function	Illumination Category	Wall Display Power (W/ft)	Allowed Floor Display Power (W/ft²)	Allowed Ornamental/ Special Effect Lighting
Auditorium	D	2.25	0.3	0.5
Civic Meeting Place	D	3.15	0.2	0.5
<del>Commercial and industrial storage</del>				
<del>—— Inactive</del>	<del>B</del>			
<del>—— Active: bulky items; large labels</del>	<del>C</del>			
<del>—— Active: small items; small labels</del>	<del>D</del>			
Convention, conference, multipurpose, and meeting centers	D	2.5	0.4	0.5
<del>Correction Facility cells and day rooms</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0</del>
Dining	B	1.5	0.6	<del>0.6</del> 0.5
<del>Dressing room</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>Education facilities</del>				
<del>—— Classrooms, lecture, training, vocational room</del>	<del>D</del>	<del>5.5</del>	<del>0</del>	<del>0</del>
<del>—— Science Labs</del>	<del>E</del>	<del>5.5</del>	<del>0</del>	<del>0</del>
<del>Exercise center, gymnasium</del>	<del>IESNA HB</del>	<del>0</del>	<del>0</del>	<del>0</del>
Exhibit, museum	C	<del>20.0–15.0</del>	<del>1.4–1.2</del>	<del>0.7–0.5</del>
Financial Transactions	D	3.15	0.2	<del>0.6</del> 0.5
<del>Food Service Facilities</del>				
<del>—— Butcher Shop, Food Display, Galley, Kitchen, Scullery</del>	<del>E</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>—— All other</del>	<del>C</del>	<del>0</del>	<del>0</del>	<del>0</del>
Grocery store	D	9.9	1.1	0
<del>Housing, Public, and Commons Areas</del>				
<del>—— Multi-family</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0.0</del>
<del>—— Dormitory, Senior Housing</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0.0</del>
Hotel function area	D	2.25	0.2	0.5
<del>Laundry</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>Library (Reading areas, Stacks) 1</del>	<del>D</del>	<del>0</del>	<del>0</del>	<del>0.6</del>
Lobbies:				
Hotel lobby	C	3.15	0.2	<del>0.60</del> 0.5
Main entry lobby	C		0.2	
<del>Locker 1</del>	<del>C</del>	<del>0</del>	<del>0</del>	<del>0</del>
Lounge/recreation	C	7	0	<del>0.7</del> 0.5
Malls and atria	D	3.5	0.5	<del>0.6</del> 0.5
<del>Medical and clinical care</del>	<del>IESNA HB</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>Office</del>		<del>0</del>	<del>0</del>	<del>0</del>
<del>—— Open office, Intensive VDT use</del>	<del>D</del>			
<del>—— Open office, Intermittent VDT use</del>	<del>E</del>			
<del>—— Private office</del>	<del>E</del>			
<del>Police or fire stations</del>	<del>IESNA HB</del>	<del>0</del>	<del>0</del>	<del>0</del>
Religious worship	D	1.5	0.5	0.5

Retail merchandise sales, wholesale showrooms	D	<del>17.0</del> <u>14.0</u>	<del>1.2</del> <u>1.0</u>	<del>0.7</del> <u>0.5</u>
<del>Public rest areas along state and federal roadways</del>	<del>IESNA HB</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>Stairways and corridors, toilets and washrooms</del>	<del>B</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>Tenant lease space</del>	<del>C</del>	<del>0</del>	<del>0</del>	<del>0</del>
Theaters:				
Motion picture	C	3	0	<del>0.6</del> <u>0.5</u>
Performance	D	6	0	<del>0.6</del> <u>0.5</u>
Transportation Function	D	3.15	0.3	<del>0.6</del> <u>0.5</u>
Waiting area	C	3.15	0.2	<del>0.6</del> <u>0.5</u>
<del>All other not included above</del>	<del>IESNA HB</del>	<del>0</del>	<del>0</del>	<del>0</del>
<del>1. Library stacks and locker rooms may use a room cavity ratio (RCR) of &gt; 7 in Table 146-I.</del>				

**TABLE ~~146-H~~ 146-F ADJUSTMENTS FOR MOUNTING HEIGHT ABOVE FLOOR**

Height in feet above finished floor and bottom of luminaire(s)	<del>Floor Display—</del> Multiply by	<del>Floor Display or</del> Wall Display – Multiply by
<del>11'-6" or less</del> <u>&lt; 12'</u>	<del>1.0</del>	1.0
<del>&gt;11'-6" 12' to 16'</del>	<del>1.2</del>	1.15
<del>&gt;16' to 20'</del>	<del>1.4</del>	<del>1.35</del> <u>1.3</u>
<del>&gt; 20'</del>	<del>2.0</del>	<del>1.75</del> <u>1.5</u>

**TABLE ~~146-I~~ 146-G ILLUMINANCE CATEGORIES A THROUGH G LIGHTING POWER DENSITY VALUES (WATTS/FT<sup>2</sup>)**

IESNA Illuminance Category	RCR<3.5	3.5<RCR<7.0	RCR>7.0
A	0.2	0.3	0.4
B	0.4	0.5	0.7
C	0.6	0.8	1.1
D	0.9	1.2	1.4
E	1.3	1.8	2.5
F	2.7	3.5	4.7
G	8.1	10.5	13.7



# Draft for April 4, 2011 Staff Workshop

## 147 148 NR Outdoor Lighting and Signs

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### SECTION 147 – REQUIREMENTS FOR OUTDOOR LIGHTING

This section applies to all outdoor lighting, whether attached to buildings, poles, structures or self supporting, including but not limited to, hardscape areas including parking lots, lighting for building entrances, sales and non-sales canopies; lighting for all outdoor sales areas; and lighting for building facades.

**EXCEPTIONS to Section 147:** When more than 50 percent of the light from a luminaire falls on one or more of the following applications, the lighting power for that luminaire shall be exempt from Section 147(b):

1. Temporary outdoor lighting.
2. Lighting required and regulated by the Federal Aviation Administration, and the Coast Guard.
3. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
4. Lighting for sports and athletic fields, and children's playground.
5. Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.
6. Lighting specifically for Automated Teller Machines as required by California Financial Code Section 13040, or required by law through a local ordinance.
7. Lighting of public monuments.
8. Signs shall meet the requirements of Section 148.
9. Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of the California Electrical Code.
10. Lighting of tunnels, bridges, stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
11. Landscape lighting.
12. In theme parks: outdoor lighting for themes and special effects.
13. Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multiscene or theatrical cross-fade control station accessible only to authorized operators.
14. Outdoor lighting systems for qualified historic buildings, as defined in the California Historic Building Code (Title 24, Part 8), if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with Section 147.

(a) **Outdoor Lighting Power Trade-offs.** Outdoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to Section 147(d)1 for general hardscape lighting allowance may be traded to specific applications in Section 147(d)2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section 147(d)1A.

2. Allowed lighting power determined according to Section 147(d)2 for additional lighting power allowances for specific applications shall not be traded between specific applications, or to hardscape lighting in Section 147(d)1.

~~3. Allowed lighting power determined according to Section 147(d)3 for additional lighting power allowances for local ordinance shall not be traded to specific applications in Section 147(d)2 or to hardscape areas not covered by the local ordinance.~~

~~34.~~ Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.

- (b) **Outdoor Lighting Power.** An outdoor lighting installation complies with this section if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Subsection (d). The allowed outdoor lighting shall be calculated by Lighting Zone as defined in Section 10-114. Local governments may amend lighting zones in compliance with Section 10-114.
- (c) **Calculation of Actual Lighting Power.** The wattage of outdoor luminaires shall be determined in accordance with Section 130~~(e)~~ and (f).
- (d) **Calculation of Allowed Lighting Power.** The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section 147(d)1, and the sum of the additional lighting power allowance for specific applications determined in accordance with Section 147(d)2, ~~and the sum of the additional lighting power allowances for local ordinance determined in accordance with Section 147(d)3.~~

1. **General Hardscape Lighting Allowance.** Determine the general hardscape lighting power allowances as follows:

- A. The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is 10 times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from TABLE 147-A for the appropriate Lighting Zone.
- B. Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section 147(d)1A. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from TABLE 147-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:
  - i. Landscaped areas completely enclosed within the hardscape area, and which have width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.
  - ii. Landscaped areas completely enclosed within the hardscape area, and which width or length are a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
  - iii. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.
- C. Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from TABLE 147-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.
- D. The general hardscape lighting allowance shall be the sum of the allowed watts determined from (A), (B) and (C) above.

2. **Additional Lighting Power Allowance for Specific Applications:** Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with TABLE 147-B for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

3. ~~**Additional Lighting Power Allowance for Local Ordinance Requirements:**~~ For hardscape areas, including parking lots, site roadways, driveways, sidewalks, walkways or bikeways, when specific light levels are required by law through a local ordinance, and provided the local ordinance meets Section 10-114, additional lighting power for those hardscape areas covered by the local ordinance requirement shall be the smaller of the additional lighting allowances for local ordinance determined from TABLE 147-C for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

**TABLE 147-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE**

Type of Power Allowance	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Area Wattage Allowance (AWA)	<del>0.036</del> <u>0.035</u> W/ft <sup>2</sup>	0.045 W/ft <sup>2</sup>	<del>0.092</del> <u>0.090</u> W/ft <sup>2</sup>	0.115 W/ft <sup>2</sup>
Linear Wattage Allowance (LWA)	<del>0.36</del> <u>0.25</u> W/lf	0.45 W/lf	<del>0.92</del> <u>0.60</u> W/lf	<del>1.15</del> <u>0.85</u> W/lf
Initial Wattage Allowance (IWA)	340 W	510 W	770 W	1030 W

**TABLE 147-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS**

All area and distance measurements in plan view unless otherwise noted.

	Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
<b>WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.</b>					
	<b>Building Entrances or Exits.</b> Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	30 watts	<del>75</del> 60 watts	<del>400</del> 90 watts	<del>420</del> 90 watts
	<b>Primary Entrances to Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities.</b> Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	45 watts	80 watts	120 watts	130 watts
	<b>Drive Up Windows.</b> Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	40 watts	75 watts	125 watts	200 watts
	<b>Vehicle Service Station Uncovered Fuel Dispenser.</b> Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	120 watts	175 watts	185 watts	330 watts
<b>WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.</b>					
	<b>Outdoor Sales Frontage.</b> Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	No Allowance	22.5 W/linear ft	36 W/linear ft	45 W/linear ft
<b>WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.</b>					
	<b>Hardscape Ornamental Lighting.</b> Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	No Allowance	0.02 W/ft²	0.04 W/ft²	0.06 W/ft²
<b>WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). Use as appropriate provided that none of the following specific applications shall be used for the same area.</b>					
	<b>Building Facades.</b> Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	No Allowance	0.18 W/ft²	0.35 W/ft²	0.50 W/ft²
	<b>Outdoor Sales Lots.</b> Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non sales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within 5 mounting heights of the sales lot area.	0.164 W/ft²	0.555 W/ft²	0.758 W/ft²	1.285 W/ft²
	<b>Vehicle Service Station Hardscape.</b> Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	0.014 W/ft²	0.155 W/ft²	0.308 W/ft²	0.485 W/ft²
	<b>Vehicle Service Station Canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.514 W/ft²	1.005 W/ft²	<del>1.358</del> 1,300 W/ft²	<del>2.285</del> 2,200 W/ft²
	<b>Sales Canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	No Allowance	0.655 W/ft²	0.908 W/ft²	1.135 W/ft²

	Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
	<b>Non-sales Canopies.</b> Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.084 W/ft <sup>2</sup>	0.205 W/ft <sup>2</sup>	0.408 W/ft <sup>2</sup>	0.585 W/ft <sup>2</sup>
	<b>Guard Stations.</b> Allowance up to 1,000 square feet per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.	0.154 W/ft <sup>2</sup>	0.355 W/ft <sup>2</sup>	0.708 W/ft <sup>2</sup>	0.985 W/ft <sup>2</sup>
	<b>Student Pick-up/Drop-off zone.</b> Allowance for the area of the student pick-up/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked-up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	No Allowance	0.12 W/ft <sup>2</sup>	0.45 W/ft <sup>2</sup>	No Allowance
	<b>Outdoor Dining.</b> Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.014 W/ft <sup>2</sup>	0.135 W/ft <sup>2</sup>	<del>0.258</del> 0.240 W/ft <sup>2</sup>	<del>0.435</del> 0.400 W/ft <sup>2</sup>
	<b>Special Security Lighting for Retail Parking and Pedestrian Hardscape.</b> This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.007 W/ft <sup>2</sup>	0.009 W/ft <sup>2</sup>	0.019 W/ft <sup>2</sup>	No Allowance

**TABLE 147-C ADDITIONAL LIGHTING POWER ALLOWANCE FOR ORDINANCE REQUIREMENTS**

ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN AVERAGE LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, AVERAGE)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0	0	0	0
1.0	0.004	0	0	0
1.5	0.024	0.015	0	0
2.0	0.044	0.035	0	0
3.0	0.084	0.075	0.028	0.005
4.0 or greater	0.124	0.115	0.068	0.045
ADDITIONAL LIGHTING POWER ALLOWANCE (W/ft <sup>2</sup> ) WHEN MINIMUM LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.				
Required (horizontal foot-candles, MINIMUM)	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.5	0.004	0	0	0
1.0	0.044	0.035	0	0
1.5	0.124	0.115	0.068	0.045
2.0	0.164	0.155	0.108	0.085
3.0	0.164	0.155	0.108	0.085
4.0 or greater	0.164	0.155	0.108	0.085





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## SECTION 148 – REQUIREMENTS FOR SIGNS

This section applies to all internally illuminated and externally illuminated signs, unfiltered light emitting diodes (LEDs), and unfiltered neon, both indoor and outdoor. Each sign shall comply with either subsection (a) or (b), as applicable.

(a) **Maximum Allowed Lighting Power.**

1. For internally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 12 watts per square foot. For double-faced signs, only the area of a single face shall be used to determine the allowed lighting power.
2. For externally illuminated signs, the maximum allowed lighting power shall not exceed the product of the illuminated sign area and 2.3 watts per square foot. Only areas of an externally lighted sign that are illuminated without obstruction or interference, by one or more luminaires, shall be used.

(b) **Alternate Lighting Sources.** The sign shall comply if it is equipped only with one or more of the following light sources:

1. High pressure sodium lamps; or
2. Metal halide lamps that are:
  - A. Pulse start or ceramic served by a ballast that has a minimum efficiency of 88 percent or greater, or
  - B. Pulse start that are 320 watts or smaller, are not 250 watt or 175 watt lamps, and are served by a ballast that has a minimum efficiency of 80 percent.

Where ballast efficiency is the measured output wattage to the lamp divided by the measured operating input wattage when tested according to ANSI C82.6-2005; or

3. Neon or cold cathode lamps with transformer or power supply efficiency greater than or equal to following:
  - A. A minimum efficiency of 75 percent when the transformer or power supply rated output current is less than 50 mA; or
  - B. A minimum efficiency of 68 percent when the transformer or power supply rated output current is 50 mA or greater.

Where the ratio of the output wattage to the input wattage is at 100 percent tubing load; or

4. Fluorescent ~~lamps-lighting systems meeting one of the following requirements:~~

~~A. with a~~ Use only lamps with a minimum color rendering index (CRI) of 80, or

B. Use only electronic ballasts with a fundamental output frequency not less than 20 kHz; or

5. Light emitting diodes (LEDs) with a power supply having an efficiency of 80 percent or greater; or

**EXCEPTION to Section 148(b)5:** Single voltage external power supplies that are designed to convert 120 volt AC input into lower voltage DC or AC output, and have a nameplate output power less than or equal to 250 watts, shall comply with the applicable requirements of the Appliance Efficiency Regulations (Title 20).

6. Compact fluorescent lamps that do not contain a medium screw base sockets (E24/E26) ; or
7. ~~Electronic ballasts with a fundamental output frequency not less than 20 kHz;~~

**EXCEPTION 1 to Section 148:** Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign, or an externally illuminated sign.

**EXCEPTION 2 to Section 148:** Exit signs. Exit signs shall meet the requirements of the Appliance Efficiency Regulations.

**EXCEPTION 3 to Section 148:** Traffic Signs. Traffic signs shall meet the requirements of the Appliance Efficiency Regulations.

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## SECTION 149 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES AND TO EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

(b) **Alterations.** Alterations to existing nonresidential, high-rise residential, or hotel/motel buildings or alterations in conjunction with a change in building occupancy to a nonresidential, high-rise residential, or hotel/motel occupancy not subject to Subsection (a) shall meet either Item 1 or 2 below.

1. **Prescriptive approach.** The altered envelope, space conditioning, lighting and water heating components, and any newly installed equipment serving the alteration, shall meet the applicable requirements of Sections 110 through 139; and

~~NOTE: Replacement of parts of an existing luminaire, including installing a new ballast or new lamps, without replacing the entire luminaire is not an alteration subject to the requirements of Section 149(b)1.~~

- A. Alterations to the building envelope other than those subject to Section 149(b)1B shall comply with the applicable subsections i through iii below:
  - i. For all nonresidential, high-rise residential, and hotel/motel occupancies, when fenestration is not altered or where there are no alterations that increase the fenestration area, all altered components shall meet the requirements of Section 143(a) for the altered component,

**EXCEPTION to Section 149(b)1Ai:** When either (1) less than 150 square feet of an entire building's fenestration is replaced, or (2) 50 square feet or less of fenestration area is added, compliance may be shown with Section 149(b)Ai except that the RSGC requirement of Section 143(a)5 or the solar heat gain coefficient of Section 143(a)6 is not required.

- ii. Nonresidential buildings shall not increase the Overall TDV Energy of the building envelope.
  - iii. For high-rise residential and hotel/motel buildings, alterations shall meet the requirements of Sections 143(a)1 through 143(a)7.

**EXCEPTION to Section 149(b)1Aiii:** Up to 150 square feet of added window area may be excepted from the requirements of Section 143(a)5, and up to 50 square feet of added skylight area may be excepted from the requirements of Section 143(a)6A. The added windows shall meet the RSHG requirements for the 30-40 percent of WWR of **Error! Reference source not found.** and added skylights shall meet the SHGC for the 2.1 to 5 percent area of **Error! Reference source not found.**

- F. Spaces with lighting systems installed for the first time shall meet the requirements of Sections 119, 130, 131, 132, 134, 143(c), 146, and 147; and
- G. When the requirements of Section 131(c)2B are triggered by the addition of skylights to an existing building and the lighting system is not re-circuited, the daylighting control need not meet the multi-level requirements in Section 131(c)2Diii.
- H. New internally and externally illuminated signs shall meet the requirements of Sections 119, 133 and 148.
- I. Alterations to existing indoor lighting systems shall meet the following requirements:

NOTE: Replacement of parts of an existing luminaire, including new lamps, reflectors, and lenses, is not an alteration subject to the requirements of Section 149(b)1I. However, replacement of ballasts is subject to the applicable requirements of Section 149(b)1I.

- i. Enclosed spaces in which aAlterations ~~that~~ increase the connected lighting load, ~~replace, or remove and re-install a total of 50 percent or more of the luminaires in an enclosed space,~~ shall meet the requirements of Sections 130, 131(a and c), 134 and 146; and

- ii. In addition to requirements of Section 149(b)1I(i), Enclosed spaces in which an existing lighting power density increases from less than 0.5 watts per square foot shall meet the daylighting requirements of Section 143(c); and
- ii. The following wiring alterations shall meet the requirements of Sections 119, 131, and 134:
  - a. Where new or moved wiring is being installed to serve added or moved luminaires; or
  - b. Where conductor wiring from the panel or from a light switch to the luminaires is being replaced; or
  - c. Where a lighting panel is installed or relocated.
- iii. Enclosed spaces in which a total of 10 percent or more of the ballasts or luminaires are replaced, or removed and re-installed, shall meet the requirements of Sections 130, 131(a, b and c), 134 and 146; and EXCEPTION to Section 149(b)1I(iii). Alterations in which less than 30 luminaires or ballasts are replaced in the entire building.
- iv. Where a lighting panel is installed or replaced, the spaces it serves shall meet the requirements of Section 131(c); and
- v. Where conductor wiring from a lighting panel or from a light switch to the luminaires is being added or replaced, the spaces it services shall meet the requirements of Section 131(a, b, and c); and
- vi. For an alteration where an existing enclosed space is subdivided into two or more spaces, the new enclosed spaces shall meet the requirements of Sections 131(a) and (d); and
- iv. Alterations that have less than 0.5 watts per square foot and increase the existing lighting power density to 0.5 watts per square foot or greater shall meet the requirements of Sections 119, 130, 131, 134, 143(c), and 146.
- vii. Alterations in which daylighting requirements of Sections 131(c), 141, 143(c) and 146 are required (to be determined)
- EXCEPTION 1 to Section 149(b)1I: Lighting using existing wiring is in existing ceilings, ducts or walls which are constructed, insulated or sealed with asbestos shall not be required to comply with Section 131.
- EXCEPTION 2 to Section 149(b)1I: Luminaires which are not replaced, removed, or reinstalled, and which are installed in hard ceilings shall not be required to comply with Section 131(b and d)

- J. Alterations to existing outdoor lighting systems that for any lighting application increase the connected lighting load or replace more than 50 percent of the luminaires shall meet the requirements of Section 147; and
- K. Alterations to existing internally and externally illuminated signs that increase the connected lighting load, replace and rewire more than 50 percent of the ballasts, or relocate the sign to a different location on the same site or on a different site shall meet the requirements of Section 148; and

**NOTE:** Replacement of parts of an existing sign, including replacing lamps, the sign face or ballasts, that do not require rewiring or that are done at a time other than when the sign is relocated, is not an alteration subject to the requirements of Section 149(b)1K.